National Library of Canada
Bibliothèque nationale du Canada

Canadian Theses Service
Service des thèses canadiennes

Ottawa, Canada
K1A 0N4

NOTICE

The quality of this microform is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

Reproduction in full or in part of this microform is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30, and subsequent amendments.

AVIS

La qualité de cette microforme dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de qualité inférieure.

La reproduction, même partielle, de cette microforme est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30, et ses amendements subséquents.

NL-339 (r. 88/04) c

Canada

National Library of Canada
Bibliothèque nationale du Canada

Canadian Theses Service
Service des thèses canadiennes

Ottawa, Canada
K1A 0N4

The author has granted an irrevocable non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of his/her thesis by any means and in any form or format, making this thesis available to interested persons.

L'auteur a accordé une licence irrévocable et non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de sa thèse de quelque manière et sous quelque forme que ce soit pour mettre des exemplaires de cette thèse à la disposition des personnes intéressées.

The author retains ownership of the copyright in his/her thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without his/her permission.

L'auteur conserve la propriété du droit d'auteur qui protège sa thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

ISBN 0-315-55427-4

Canada

THE UNIVERSITY OF ALBERTA

THE EFFECTIVENESS OF COMPUTER-ASSISTED LANGUAGE LEARNING IN DEVELOPING LISTENING AND READING COMPREHENSION SKILLS AND ATTITUDE IN ESL INSTRUCTION OF GRADE EIGHT FRENCH STUDENTS

by

WALID GEORGES HADDAD

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF EDUCATION

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

EDMONTON, ALBERTA

FALL, 1989

THE UNIVERSITY OF ALBERTA

RELEASE FORM

NAME OF AUTHOR: Walid Georges Haddad

TITLE OF THESIS: THE EFFECTIVENESS OF COMPUTER-ASSISTED LANGUAGE LEARNING IN DEVELOPING LISTENING AND READING COMPREHENSION SKILLS AND ATTITUDE IN ESL INSTRUCTION OF GRADE EIGHT FRENCH STUDENTS

DEGREE: Master of Education

YEAR THIS DEGREE GRANTED: 1989

Permission is hereby granted to THE UNIVERSITY OF ALBERTA LIBRARY to reproduce single copies of this thesis and to lend or sell such copies for private, scholarly or scientific research purposes only.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

(Signed) W. G. Haddad

PERMANENT ADDRESS:

1360 Rathburn Rd. East, Apt. 407
Mississauga, Ont.
L4W 4H4

Date 25 Sep 1989

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled THE EFFECTIVENESS OF COMPUTER-ASSISTED LANGUAGE LEARNING IN DEVELOPING LISTENING AND READING COMPREHENSION SKILLS AND ATTITUDE IN ESL INSTRUCTION OF GRADE EIGHT FRENCH STUDENTS submitted by Walid Georges Haddad in partial fulfillment of the requirements for the degree of Master of Education.

Michael Szabo
.....
Supervisor

.....

.....

Date 25 September 1989

To my wife Connie

Abstract

The purpose of this study was to compare two media used to supplement classroom instruction to learn creative writing. Achievement scores of French speaking students in an ESL classroom using a word processor to do creative writing were compared to achievement scores of French speaking students in an ESL classroom using pencil and paper to do creative writing.

The Secondary Level English Proficiency (SLEP) test was used as an evaluation instrument to measure English listening and reading comprehension. An on-line student opinion questionnaire was used to assess student opinion concerning the use of Computer-Assisted Language Learning (CALL) as an instructional medium in the ESL classroom. The student opinion questionnaire consisted of 13 Likert scale items and 5 open-ended questions.

A group of 30 French speaking students in a grade eight ESL class were administered Test Form 2 of the SLEP test as a pretest. The students were then matched according to their pretest scores and randomly assigned to one of two groups. Following the same classroom instruction by the same teacher, one group did creative writing in English using a word processor and the other group did creative writing in English using pencil and paper, for a period of two weeks. Following this two week period, both groups were administered Test Form 3 of the SLEP test as a posttest.

The learning situation was then reversed, with the first group switching to pencil and paper to do creative writing, and the second group using the word processor to do creative writing, for a period of two weeks. After both groups had experienced both the pencil and paper method and the CALL media, the on-line questionnaire was administered to all students participating in the study.

A t-test (two-tail test) was used to analyze the posttest scores of the SLEP test. Results from this study indicated that there was no significant difference in English listening and reading comprehension between the two groups.

Scores obtained on the Likert scale were used to analyze student responses to the questionnaire. Results from the questionnaire indicated that students favored the use of the CALL method over the pencil and paper method to do creative writing.

Acknowledgements

I wish to acknowledge my gratitude to those individuals who contributed to the success of this study. My sincere appreciation is expressed to Dr. Mike Szabo for his support, encouragement and technical assistance throughout this study. His guidance and expectations helped me to persevere and carry out this study. My appreciation is also expressed to Dr. David Bain and Dr. David Parker for their valuable and constructive comments.

I would also like to express my gratitude to the principal, teacher and students who participated in the study. A special thanks is extended to the teacher for her dedication and enthusiasm which contributed to the success of this project.

I would like to thank Don Lee and Satrohan Mangal who shared their knowledge with me. Also, I would like to express my gratitude to Mike Carbonaro and Norma Nocente whose support and encouragement throughout this study strengthened my determination to finish the project.

I am particularly grateful to my wife Connie. Her love, dedication and endless support made this study worthwhile.

TABLE OF CONTENTS

I THE PROBLEM 1

1. Introduction 1
2. Statement of the Problem 5
3. Purpose and Research Questions 6
4. Definition of Terms 7
5. Limitations 9
6. Overview 10

II REVIEW OF THE LITERATURE 11

1. Introduction 11
2. Language and Cognitive Psychology 11

Writing as a Mode of Language 12

3. The History of CALL 13

CALL on Mainframe Computers 13

CALL on Microcomputers 13

4. Recent CALL Strategies 15

Computer-Assisted Learning 15

Individualization of Learning 15

Motivation 15

Control of Teaching/Learning 16

CAI and the Macintosh 17

Word Processing 18

Creative Writing 18

Revision 19

Computers in English as a Second Language Classrooms 19
5. Designing Computer Writing Environments 20
Dyadic Learning 20
6. Conclusion 21

III METHODS 23
1. Design 23
Phase I 25
Phase II 26
2. Subjects 26
3. Procedure 27
4. Materials 29
Instructional Materials 29
Hardware 29
Software 30
Instruments 31
SLEP Standardized Test 31
Characteristics of the SLEP test 31
Technical Characteristics of the SLEP test 32
Student Opinion Questionnaire 32

IV RESULTS 35
1. Statistical Analysis 35
2. Results 36
Research Questions 38

Microcomputer Experience 51

V DISCUSSION, CONCLUSION AND RECOMMENDATIONS 53

1. Discussion 53

Achievement 53

Attitude 54

2. Conclusion 55

3. Recommendations for Future Research 57

REFERENCES 59

APPENDICES

Appendix A: Student Opinion Questionnaire 65

Appendix B: On-line Questionnaire 69

Appendix C: Letter to the Parents 77

LIST OF TABLES

1. Design of this Study 24
2. Student Distribution 27
3. t-test (one-tail test) analysis: Group A, pretest-posttest scores 37
4. t-test (one-tail test) analysis: Group B, pretest-posttest scores 37
5. t-test (two-tail test) analysis: Section 1, Test Form 3 39
6. t-test (two-tail test) analysis: Section 2, Test Form 3 40
7. Likert scale Averages: Items 1-13, Part I 41
8. Likert scale Averages: Items 1, 2, 4, 7 and 9, Part I 42
9. Subject Distribution: Items 1, 2, 4, 7 and 9, Part I 43
10. Correlation Coefficient Between Items 1, 2, 4, 7 and 9, Part I 44
11. Subject Distribution: Item 4, Part II 45
12. Likert scale Averages: Items 5, 8 and 11, Part I 46
13. Subject Distribution: Items 5, 6, 8, 11, 12 and 13, Part I 47
14. Correlation Coefficient Between Items 5, 8 and 11, Part I 47
15. Likert scale Averages: Items 6, 12 and 13, Part I 48
16. Subject Distribution: Items 6, 12 and 13, Part I 49
17. Correlation Coefficient Between Items 6, 12 and 13, Part I 49
18. Subject Distribution: Items 3 and 10, Part I 50
19. Likert scale Averages: Items 3 and 10, Part I 51
20. Correlation Coefficient Between Items 3 and 10, Part I 51
21. Microcomputer Experience: Item 5, Part II 52

LIST OF FIGURES

1. A view of the SmoothTalker screen..... 30

CHAPTER I

THE PROBLEM

1. Introduction

The influence of computers in our society is no longer questionable, as they are present in virtually every field in which they are deemed viable. The question today is one, rather, of utilization of the computer to its fullest potential. Educators, as providers of learning environments for the future adults of North American society, are certainly among the most adamant of those seeking ways to unharness the enormous potential of the computer, as they attempt to provide ever more appropriate and effective learning situations in today's classrooms (Icabone & Hannaford, 1986).

The four modes of using the computer commonly found in the educational setting are: administration, testing, classroom aids and direct teaching. For administrative purposes, the computer is used to create timetables, type correspondence, assess budgets, plan courses, calculate and store student marks, etc. In testing, the computer can be used not only to ascertain student knowledge, proficiency, achievement, aptitude, etc., but also to keep records of this data to be referred to whenever needed. As a classroom aid, the computer is used as a medium for presentation of material, as would be a tape recorder or a video screen. In this mode the computer is not the centre of the learning situation. The fourth mode is that of direct teaching, where the computer is used in the teaching of some aspect of the curriculum.

Most computer programs used for direct teaching are introduced to teach specific subject matter such as mathematics, science or language arts. These types of programs are often referred to as computer-assisted instruction (CAI) courseware or computer-based

instruction (CBI) courseware. There are five major types of computer-assisted instruction programs; tutorials, drills, simulations, games and tests (Alessi & Trollip, 1985). In addition, CBI often incorporates several of these types within a single lesson.

Tutorials are used to present concepts and guide students through the material to be learned. Drills and games allow the user to practice previously encountered skills over and over. Testing programs allow the assessment of knowledge, learning and advancement. Simulation is a more advanced form of CAI, as it allows for higher level cognitive situations. The user is presented with scenarios from real life situations, and must make judgements and decisions. Once presented with the outcome of his choices, he must then make further decisions and choices according to the results (Alessi & Trollip, 1985).

All of these types of CAI programs have been used with varying degrees of success in various subject areas. Researchers have found improvements in academic achievement as well as an increase in student perception of learning achieved in proportion to the amount of effort expended (Lieberman & Krendl, 1987). Through the use of microcomputer-based laboratories (MBL) in the delivery of science laboratory instruction, it has been shown that MBL instruction improves learning (Lieberman & Krendl, 1987).

In a meta-analysis of findings presented by Bangert-Drowns, Kulik & Kulik (1985), forty-two controlled studies comparing CAI with other forms of instruction were analyzed. Results showed computer-based instruction to have had positive effects on student achievement in junior and senior high schools. However, the findings also showed that effects differed for various uses of the computer. For example, computer-assisted and computer-managed instruction programs proved to be quite effective, whereas programs of computer-enriched instruction were less effective. In studies focusing on disadvantaged students effects of CBI on student learning were stronger. In another analytic review, forty-eight studies on computer-based instruction in elementary schools were analyzed. Results of this synthesis indicated that younger students, as well as lower achieving

students, profit most from exposure to CAI. The review also stated that drill and practice was most effective in raising achievement scores (Niemiec, Samson, Weinstein & Walberg, 1987).

Niemiec, Samson, Weinstein and Walberg (1987) stated that, "CBI is, generally, an effective treatment in the elementary schools. Lower achieving and younger students make very substantial gains. Computers appear to enhance achievement when the learning task is relatively simple. When tasks are more complex, gains are more modest ..." (p. 98).

Recently, there has been an increased interest in the possible uses of computers in the teaching and learning of language. The computer was originally designed for mathematical and scientific purposes, but it will likely have a major impact on "not the teaching of math or science - but the teaching of writing" (Newman, 1984, p. 73).

In recent years, the focus in education has turned to learning versus teaching. The teacher is now referred to as "facilitator" of learning rather than "provider" of knowledge. The emphasis is on active participation versus passive learning (Graves, 1983; Papert, 1980). Nowhere is this change in strategy more apparent than in the area of language arts. "The focus of interest in language education has been shifting from reading to writing (This is true in England as well as America and Canada...)" (Barrs, 1983, p. 829).

> The new work on writing has had the benefit of being able to draw on the body of recent research on reading, and researchers have begun to apply to the study of writing some of the insights that inform modern reading theory. Chief among these has been an emphasis on process - on texts in the making rather than on completed texts" (Barrs, 1983, p. 829).

A similar change in strategy is now being considered in the English as a second language classroom. Educators are becoming more and more aware that "where there is a need for English to be learned as a second language, the time has come for the teacher to develop a modified curriculum" (Frey, 1976, p. 8). In the Curriculum Guideline for the

Teaching of English in French-language Schools (1988), the Ontario Ministry of Education stated, "The wide diversity in the development of English competence among students in Ontario's French-language schools necessitates the elaboration at the local level of courses of study that reflect this diversity" (p. 18).

Frey (1976) stated, "When a student comes to class completely lacking the facility to understand or speak English, we, as teachers, must indeed give much of ourselves to bring about the miracle of second-language learning ... [but] it is not an easy thing, this teaching of a whole new means of communication" (p. 8). Indeed, teachers of English as a second language in French schools in Ontario are experiencing this concern. Some students are not yet comfortable with the English language, some speak the language but cannot write it, some can read and write but do not speak with ease, and others do not comprehend English at all.

Allen (1986) stated, "The kinds of language arts experiences which support English-speaking children to develop and shape their skills in communicating in their native language are also the kinds of experiences that can support the limited English proficiency child as he or she takes on a new language" (p. 61). Just what are the kinds of language arts experiences believed to develop and shape these communication skills?

An elementary school teacher in rural New Hampshire explained, "Last year I divided language into little parts - punctuation, spelling, reading, letter writing. I made up class lessons for everything and spent my time trying to convince the children workbooks were important" (Graves, 1981, p. 51). This same teacher now teaches these concepts through creative writing sessions and individual writing conferences with the students. A study funded by the National Institute of Education shows that her students "are learning [these skills] more effectively than if they were doing drills, workbook exercises and language lessons" (Graves, 1981, p. 51).

Balajthy (1986) wrote, "Meaning-oriented language activities such as reading stories and engaging in writing are far more important than the drillwork offered by computer spelling software. Most children pick up good spelling almost automatically as they spend additional time reading and writing" (p. 439).

2. Statement of the Problem

Although there is widespread discontent with current software, there exists an awareness of and an enthusiasm for the as yet untapped possibilities of computer-assisted language learning (CALL) (Dalgish, 1987; Young, 1988). However, little research has been carried out to discover how CALL might be used to enhance more recent strategies of language teaching and language processing (Young, 1988).

Teachers of English as a second language (ESL) today hesitate to integrate the use of computers into the ESL curriculum (Dalgish, 1987). It is felt that the language arts type computer programs available on the market today are largely based on the Skinnerian stimulus-response strategies widely rejected in todays ESL classrooms (Balajthy, 1987; Dalgish, 1987; Young, 1988).

Another primary concern, one directly related to the implementation of CALL in ESL classes, is that of student opinion concerning the use of the computer environment as an educational medium within the curriculum (Johnston, 1987). However,

> Few studies of pupil attitudes to the introduction of microcomputers into the curriculum, and particularly into English lessons, are available. Yet pupil attitudes are of crucial importance to the success or failure of educational approaches and media, for negative reactions will inhibit learning whereas positive ones will make pupils more receptive to the learning activities (Johnston, 1987, p. 47).

3. Purpose and Research Questions

The purpose of this study was to determine the effectiveness of the use of Smoothtalker® software to implement CALL in ESL classes. This was done by comparing achievement based on the use of the Smoothtalker® word processing program to learn creative writing with achievement based on the use of pencil and paper to learn creative writing in ESL classes. In order to address the concern of student opinion regarding the use of computers as an educational medium, a student opinion questionnaire was also administered.

This study addressed the following research questions:

1. Does the use of CALL to supplement teaching ESL to French speaking students enhance English listening comprehension?

2. Does the use of CALL to supplement teaching ESL to French speaking students enhance English reading comprehension?

3. What is student opinion concerning the use of CALL as an educational medium in ESL classes?

Each of the above research questions was investigated by a test of an appropriate hypothesis. The following are statements of each hypothesis:

H1: There is a significant difference in posttest scores obtained on the listening comprehension section of the Secondary Level English Proficiency test (SLEP) between two groups of French speaking students using CALL and pencil and paper for creative writing in ESL classes.

H2: There is a significant difference in posttest scores obtained on the reading comprehension section of the Secondary Level English Proficiency test (SLEP) between two groups of French speaking students using CALL and pencil and paper for creative writing in ESL classes.

H3: Student opinion concerning the use of CALL as an educational medium in ESL classes is more positive than student opinion concerning conventional instruction, as measured on the Likert scale.

4. Definition of Terms

Definitions of terms used throughout the study are presented below.

Communicate. A verbal or non verbal means of sending a message, interpreting feelings or expressing an opinion.

Computer-assisted instruction (CAI). Instructional materials presented via a computer system or a computer.

Computer-assisted language learning (CALL). The use of computers in linguistics, language arts, or foreign language learning.

Computer Icons. Pictures displayed representing options or information (e.g., a symbol of a trash can represents deletion of a file).

Cursor. A marker that appears on the computer screen indicating the location of the next input.

English as a Second Language (ESL). The acquisition of the English language by individuals whose first language is other than English.

Hardware. The physical components of a computer system (e.g., monitor, disk drive, etc.).

Language. The vocal or written signs and symbols that permit communication among individuals. Language also facilitates thinking and action on the part of the human to which it is species-specific (Firschein & Fischler, 1987).

Microcomputer. An electronic device that solves problems by processing digital data according to instructions stored within its memory.

Motivation. The term used to describe the need or drive that energizes a person's behaviour.

Mouse. A pointing device used with the Macintosh Plus computer to move the cursor.

Pull-down menu. A menu that, when selected from an option list, overlays the current screen display.

Software. The instructions that make a computer perform a selected function.

Vocabulary. The collection of words that make up a language.

Word processing. The use of a computer in the preparation of printed material.

5. Limitations

This study focused on the use of the Smoothtalker® software package to implement CALL as an educational medium in ESL classes. CALL was used to supplement regular classroom instruction in English. The study did not assess age or gender differences in second language acquisition. Although important for future research in this field, these aspects were beyond the scope of this study.

Due to the limited number of computers available, together with the time allocation set out by the principal of the school involved, only grade eight students participated in this study. Although only grade eight students participated, grade five, grade six or grade seven students would also have been suitable.

A written requisition submitted by the researcher to carry out the study over 8 weeks was not honored. The reason given was that eight weeks would deprive other teachers of the use of the computers. The study was accepted but over a four-week period rather than eight weeks. The study restriction of four weeks allowed for 2 two-week periods of instruction.

For the purpose of this study one specific inplementation of CALL was tested, namely Smoothtalker®. Also, only English listening and reading skills were studied.

The study was restricted to one French school in suburban Toronto. For this reason, results cannot be generalized to the ESL population of the Toronto region in general. Only grade eight students participated in the study. Therefore, results are not

generalizable to all elementary grade levels. The school, instructor and students who participated in this study did so on a voluntary basis.

6. Overview

Chapter I presents an introduction to the problem, purpose, significance and limitations of this study. Chapter II presents a description of the writing process, the main approaches to computer-assisted language learning (CALL), a brief look at the history of computer applications to language as a new application of technology for linguists, and the necessary factors to consider when designing computer writing environments. Chapter III presents a description of the design and methodology of the experiment, including a description of the sample and the collection of data. Chapter IV presents an analysis and interpretation of the data. Chapter V develops conclusions and makes recommendations for further research in this subject area.

CHAPTER II

REVIEW OF THE LITERATURE

1. Introduction

For the purpose of this study, this chapter discusses four major themes. The first theme addresses language and cognitive psychology. The second theme focuses on the history of the evolution of CALL from mainframe computers to microcomputers. The third major theme discusses current CALL strategies. The fourth theme deals with the issue of designing computer writing environments.

2. Language and Cognitive Psychology

The domain of language development has been researched in the field of psycholinguistics by various psychologists who have offered descriptions and explanations of the development of language behavior. The most recent school of thought on human acquisition of language is that led by Noam Chomsky. Chomsky argued that the normal child is born with the capability to learn languages to which he is exposed from infancy, and that by late infancy the basic vocabulary, phonetics and grammatical structure of the language have been acquired (Chomsky, 1986).

Linguists influenced by Chomsky stress this inherent grammar-building disposition natural to man which is triggered by childhood exposure to language. The language is acquired with no necessity for formal instruction. One is simply immersed in the language environment and this innate ability will provide one with linguistic

competence (Chomsky, 1986). "A human language is a system of remarkable complexity. Language is a mirror of mind in a deep and significant sense" (Chomsky, 1975, p. 4).

This capacity for language, specific to humans, enables children to provide solutions for difficult tasks, to control impulsive action, to find solutions to problems and to control their behavior. The signs and words of language allow social contact with other humans (Vygotsky, 1979). "The cognitive and communicative functions of language then become the basis of a new and superior form of activity in children, distinguishing them from animals" (Vygotsky, 1979, p. 28). Graves (1984) stated that "children have a natural urge to express, to make marks, to 'play' with writing, to experiment boldly with new ways to put messages on paper" (p. 55).

Writing as a Mode of Language

Writing is one of four modes of the human system of communication called language, along with talking, listening and reading. These four modes of language clearly set humans apart from all other creatures of the earth (Beard, 1984).

Writing can be viewed as giving shape to information. Barrs (1983) compared what is in our head before we write, "what Vygotsky (1962) calls 'maximally compact inner speech', to a fuzzy ball of fibre. As we start to write we reach in and pull one thread, which becomes the linear thread of what we are writing" (p. 834).

3. The History of CALL

CALL on Mainframe Computers

The idea of using computers to teach ESL or any second language is not new. The earliest CALL projects that are of any significance date back to the 1960's when strategies and courseware for language learning on PLATO (Programmed Logic for Automated Teaching Options) were developed on mainframe computers at the University of Illinois (Smith, 1987). PLATO is a large-scale computer-based education system, designed to provide programs of individualized instruction and can support hundreds of simultaneous users. Each PLATO system is designed with a single, central computer. "Users are connected to the large computer by phone lines, microwave communication, video channels, and via satellite..." (Langdon, 1980, p. 21). The design of these mainframe computers enables students to communicate easily and internationally.

During this same period, programs for German and Russian were developed on mainframe computers at Stanford University and the State University of New York at Stony Brook (Davies, 1982; Smith, 1987). Elsewhere, the British government sponsored the scientific language project at the University of Essex. The objective of this project was to develop a new method of learning to read a foreign language, specifically Russian (Davies, 1982).

CALL on Microcomputers

A trend of low-cost hardware since the 1950's, as well as improved quality of software, helped make it possible for schools to integrate computers into their curriculum (Davies, 1982; Skehan, 1985).

> ...it is estimated that the total number of microcomputers in all 1,489 Alberta schools will be 26,955 by January 1, 1987. The ratio of students to microcomputers in Alberta schools on January 1, 1986 was 20.3:1. The estimated ratio of students to microcomputers in January 1, 1987 is 17.1:1 (Petruk, 1986, p. i).

Although at the writing of this research paper no official survey had been carried out in Alberta to verify these figures, it is estimated that the above ratio for 1988 had been bypassed (Petruk, 1989). CAI programs were developed to teach mathematics and science. Other programs developed to be used by business classes proved to be very popular (Petruk, 1986).

Although the microcomputer was welcomed with enthusiasm among science, mathematics and business teachers (Lieberman & Krendl, 1987) it has been slow penetrating the language classes. Computer-assisted language learning has not flourished on a larger scale owing to: (1) substandard exemplars, (2) insufficient teacher training, and (3) conflicting ideologies (Smith, 1987). Also (4), courseware does not address the learning needs and learning style of students. "For example, most programs for the foreign languages involve simple drill and practice. They do not address the teaching of higher-order skills such as comprehension, analysis, synthesis, evaluation and transfer" (Raschio & Lange, 1984).

> The initial enthusiasm for microcomputers as motivating aids to teaching a foreign language has largely been lost due to the limited types of software which have so far been available for language learning. This state of affairs led one of the leading figures in the field of language learning to suggest that teachers erase all their current language teaching software disks and use them instead for wordprocessing (Young, 1988, p. 65).

4. Recent CALL Strategies

Computer-Assisted Learning

The advantages of CAI are well documented. Commonly listed features are motivation, control of teaching/learning, and individualization of learning (Balajthy, 1987; Cook, 1985; Dalgish, 1987; Davies, 1982; Higgins, 1984; Swett, 1986; Young, 1988). Improvement in achievement scores has also been noted (Bangert-Drowns, Kulik & Kulik, 1985; Kulik, Kulik & Cohen, 1980; Niemiec, Samson, Weinstein & Walberg, 1987).

Individualization of Learning

The computer tends to meet individualized needs in pacing and control of presentation of material (Cook, 1985, Dalgish, 1987; Hedley, 1985; Young 1988). It is the user who decides when to start, stop or move on. The pace of the lesson is controlled by the user, rather than by the computer (Dalgish, 1987; Newman, 1984).

Motivation

> In the field of psychology, the topics of motivation and learning are often considered separately. However, motivation is typically seen as the fuel for learning, the director of the child's attention toward what she will seek to learn. Therefore ... motivation can be viewed as a beginning step or condition in the learning process (Thomas, 1985, p. 44).

Klausmeier (1975) stated, "(1) Retention can occur only if something has been acquired initially. (2) Transfer of an acquired outcome to a new situation can occur only if the outcome has been retained. Motivation is essential for both initial learning and

retention" (p. 427). When considering the ESL child, in order for transfer from written to oral communication to occur, their must first be retention of concepts and abilities learned, and motivation is an essential element in this initial learning process.

"Communicating in writing, whether in English or a student's native language, has often been a major block. There has been unanimous excitement from bilingual education project directors and teachers observing the increased output and new interest in rewriting and editing with computers" (Swett, 1986, p. 50). For a long time now, educators have felt that motivation is a positive factor in the consideration of computers as a tool in teaching and learning.

Early studies of academic motivation and the use of computers were based on student reports of personal attitudes toward computers. It was noted that in general, computer activities were found to be interesting and highly motivating. Recent research has confirmed these findings (Bangert-Drowns, Kulik & Kulik, 1985; Dalgish, 1987; Kulik, Kulik & Cohen, 1980; Lieberman & Krendl, 1987; Niemiec, Samson, Weinstein & Walberg, 1987). The research by Bangert-Drowns, Kulik & Kulik (1985), showed a positive change in attitude towards the computer itself, towards instruction, and towards the subject being taught. This research also showed that attendance was higher in CBI classes than in conventional classes.

Control of Teaching/Learning

Another important and viable aspect to the use of computers in language learning is that of control of learning. Papert (1980) spoke of the importance of using computers in ways which allow children to reflect on their own actions and to be in control of their own learning. We can create situations which let the user control the machine. One advantage is that teachers can direct student writing without the exertion of total and rigid control.

This allows for freedom of expression within certain bounds (Newman, 1984; Young, 1988).

"ESL students are quick to see the advantages of learning word processing as a real-world skill. Activities and courseware ... leave students with a feeling of control over the computer, the writing process, and the language" (Dalgish, 1987, p. 85)

CAI and the Macintosh

In his book, "Toward a Theory of Instruction", Bruner (1966) suggested three ways in which human beings translate experience into a model: enactive, iconic and symbolic representation. The first of these is through action - enactive representation. For example, one person cannot teach another to drive a car through explanation or diagrammatic representation. The individual must experience the actual act of driving a car. The second system of representation depends on visual or other sensory organization - iconic representation. "We may, as in an experiment by Mandler, grope our way through a maze of toggle switches, and then at a certain point in overlearning, come to recognize a visualizable path or pattern" (Bruner, 1966, p. 11). The third and final representation is that of the symbolic. It is found in words, or language, which is symbolic in nature. The word mountain symbolizes something very large, while the word pebble brings to mind something very small (Bruner, 1966).

> The Macintosh is considered a user friendly machine because it appeals to all three forms of mental representation. It's easy to learn, and its software is easy to use because of the heavy dose of enactive and iconic representation, forms we are most likely to resort to when learning something new (Dear, 1988, p. 72).

The success of the Macintosh user interface can be largely attributed to its constant use of these three representations; enactive, iconic and symbolic. This interface allows the

user to concentrate on the task at hand, writing, revising, etc., rather than on recall of computer commands necessary to carry out these tasks (Dear, 1988).

Word Processing

In a report on an experience using microcomputers and word processing at the American Language Institute of New York University, Jex (1988) stated that "currently one of the most efficient uses of microcomputers for language instruction is their use as word processors" (p. 84).

In the latest work on writing there has been an emphasis on process - on the actual creating of text versus the final product (Barrs, 1983; Graves, 1983). Word processing "allows writers to become more willing to take risks, to be tentative about meaning for longer, to consider organization and word choices more freely than ever before. What this means is that children (and adults, too) can learn a great deal about language and the writing process each time they engage in writing" (Newman, 1984, p. 494).

Because the word processor can be used to display various text samples that have been strategically designed, it is felt that it can also be used to enhance reading comprehension instruction (Jex, 1988).

Creative Writing

"As Robert Frost once said, poetry is 'just taking the same old words and putting them together in a new way to say something you've been thinking about'. We think this is pretty close to the essence of creative writing" (Petty, 1967, p. 3). Creative writing may take the form of a poem, but it may also be a story, a play, or a report.

"Variation and creativity are the very skills that ESL students need to develop and be encouraged to use, since so often their writing is restricted either syntactically or

lexically" (Dalgish, 1987, p. 90). A student's vocabulary is considerably developed through creative writing, as new words are used and ideas expressed (Petty, 1967).

Revision

Balajthy (1987) wrote, "Revision is a horrible experience, one that few teachers feel justified in inflicting upon their students. The simple, mechanical process of rewriting or retyping a three-page paper is incredibly tedious, if not degrading" (p. 74).

Some students choose their shortest text when it comes time to edit one piece of work for publishing, for the simple reason that it means less work revising and rewriting. Writing with a word processor allows students more freedom to make changes, add words and phrases, rewrite whole areas of text, and delete unwanted material. This can be done without having to expend too much time and effort writing and rewriting to achieve satisfactory results (Newman, 1984; Irwin, 1987).

Computers in English as a Second Language Classrooms

Recent research in English as a second language learning has been focusing increasingly on what can be done with language versus the acquisition of the specific forms of language. Teaching in second language is now focusing on communication versus drill (Allen, 1986).

Recent teaching strategies in ESL focus on moving computers into the ESL classroom (Cook, 1985; Daiute, 1985; Davies, 1982). In order to speed up student learning of English as a Second Language, educators have called on the computer with its tremendous capabilities as yet untapped in the field of language learning (Higgins, 1984).

Swett (1986) stated that "The computer is being used as a tool to speed up English language acquisition and proficiency in ESL classrooms across the USA" (p. 49).

Dalgish (1987) claimed that "probably the single most successful element in ESL CAI has been the word processor" (p. 82). However, little or no research has been carried out to substantiate such claims. Before CALL, and more specifically word processing, can be acknowledged as a real and viable tool in the teaching of a foreign language, empirical evidence to this effect must be obtained.

5. Designing Computer Writing Environments

There have been varied suggestions of possible learning scenarios within a computer writing environment. A single computer could be used as a learning aid for class presentations, group activities, and action-oriented writing lessons (Daiute, 1985). A teacher who has several microcomputers in a classroom could assign students to work in groups of two or three (Daiute, 1985; Lieberman & Krendl, 1987). Students could enhance communication skills while practicing writing, composing and revising. With more computers at hand, teachers could assign more writing exercises on the computer. Each student would have more time to write stories, book reports and essays, and to revise them (Daiute, 1985).

Dyadic Learning

Peer tutoring is a term used to describe situations in which one individual gives both instructional assistance and guidance to another (Ehly & Larsen, 1980). Children teaching children is an example of peer tutoring at its most basic level (Ehly & Larsen, 1980). The concept of peer tutoring is not a new one, as students have coached other students ever since Greek times.

> Aristotle is reported to have used peer teaching. The "University"of Athens consisted of an informal group of young men gathered around an eminent philosopher or rhetorician. ...It can be surmised that because of the popularity of a teacher such as Aristotle and the lack of widespread or numerous educational centers or institutions, the use of students as helpers may have been a reality (Wagner, 1982, p. 8).

Peer tutoring can also be referred to as team learning, as this kind of learning situation benefits both the tutee and the tutor (Pierce, Stahlbrand & Armstrong, 1984). Studies have shown that "tutors experienced attitudinal changes, while tutees showed gains in achievement" (Wagner, 1982, p. 227).

Studies indicate that in most cases peer teaching enhances student learning. Research has been carried out to compare student team learning to traditionally taught classes. In eighteen out of twenty-one studies, subjects in the student team learning classes learned significantly more than those in the traditionally taught classes; in three there were no differences (Slavin, 1983). Another study compared the use of language arts CAI in pairs versus individually. The pairs "scored higher on the achievement post-test than students who worked individually" (Lieberman & Krendl, 1987, p. 25). Because of the value of peer tutoring, subjects in the present study worked alone on computers to control this effect.

6. Conclusion

Teaching strategies in today's language classes are shifting from drill and practice exercises to more creative writing according to Balajthy (1986) and Graves (1983). It is felt that ESL students would benefit from the same learning strategies now being applied in regular language classes (Allen, 1986; Frey, 1976). Current CALL software is of the drill and practice type, which does not enhance learning at the higher cognitive levels

(Balajthy, 1987; Cook, 1985; Dalgish, 1987; Young, 1988). In order for computers to fit into the new curriculum, software must be created to meet current learning needs.

It has been established that word processing enhances creative writing in various ways. First of all, the idea of using a computer is motivational in itself. Positive attitudes towards learning are enhanced through the use of CALL. Secondly, word processing allows the writer to worry less about editing spelling, grammar, punctuation, etc. He may therefore better concentrate on flow of ideas and length of production. Also, manipulation of vocabulary and text is rendered easier through the use of a word processor (Jex, 1988). Ease of addition, deletion and replacement of text encourages creativity and experimentation in language usage (Balajthy, 1987; Dalgish, 1987; Irwin, 1987; Jex, 1988; Newman, 1984; Young, 1988).

To this date little or no research has been carried out to evaluate the effects of the use of word processing as a CALL medium in ESL classes. Before word processing can be impelmented in the ESL classroom as an instructional medium, favorable evidence is needed as to its effect on motivation and learning in the ESL learning environment.

> In the case of the CALL drill-and-practice programs, the outcome of the interaction is predetermined by the computer. Here, I believe, is a fundamental difference between two kinds of computer interaction: those which permit the user to negotiate the outcome of the interaction, and those which do not. This observation is not new. ...But so far this hypothesis has not been subjected to an empirical test (Young, 1988, p. 70).

CHAPTER III

METHODS

1. Design

The purpose of this study was to investigate the effectiveness of CALL in ESL through the following hypotheses:

H1: There is a significant difference in posttest scores obtained on the listening comprehension section of the Secondary Level English Proficiency test (SLEP) between two groups of French speaking students using CALL and pencil and paper for creative writing in ESL classes.

H2: There is a significant difference in posttest scores obtained on the reading comprenehsion section of the Secondary Level English Proficiency test (SLEP) between two groups of French speaking students using CALL and pencil and paper for creative writing in ESL classes.

H3: Student opinion concerning the use of CALL as an educational medium in ESL classes is more positive than student opinion concerning conventional instruction, as measured on the Likert scale.

This pretest-posttest control group design (see Table 1) was modelled after Borg and Gall (1983), Campbell and Stanley (1966), Kerlinger (1973) and Moore (1983). The independent variable in this study was the use of the microcomputer to foster creative writing. The dependent variables were the posttest scores collected from Test Form 3 of the SLEP test and the attitude measure.

After reviewing several tests, the researcher selected a standardized test, the Secondary Level English Proficiency Test (SLEP); Test Form 2 to be administered as a pretest and Test Form 3 to be administered as a posttest for the study. A parallel form of the same test should eliminate the possibility of improvement in performance on the

posttest due to prior, recent exposure to the test (Campbell & Stanley, 1966; Moore, 1983).

During a one week period before beginning the study, subjects were instructed in the microcomputer environment as well as the word processing package (Smoothtalker®) to be used throughout the study. This allowed for a familiarization period before commencement of the actual experimental study.

The study consisted of two consecutive phases, phase I and phase II, each phase consisting of two weeks. The subjects were divided into two groups. The posttest was administered to all subjects at the end of the first two weeks. This allowed (for ethical reasons) both groups to experience the CALL methodology for an equal period of time. The questionnaire was administered at the end of four weeks, after all subjects had experienced both instructional media (see Table 1).

Table 1

Design of this Study

<-------Phase I (duration 2 weeks)----------> <-----Phase II (duration 2 weeks)---- >

SLEP Test			**SLEP Test**			**On-line**
Form 2			**Form 3**			**Questionnaire**
Pretest	**Group**	**Group**	**Posttest**	**Group**	**Group**	
	A	**B**		**B**	**A**	
Given to	Uses	Uses paper	Given to	Uses	Uses paper	Administered
all subjects	SmoothTalker	and pencil	all subjects	SmoothTalker	and pencil	to all subjects
	for 2 weeks	for 2 weeks		for 2 weeks	for 2 weeks	
N=30	N=15	N=15	N=30	N=15	N=15	N=30
19 Females	10 Females	9 Females	19 Females	9 Females	10 Females	19 Females
11 Males	5 Males	6 Males	11 Males	6 Males	5 Males	11 Males

Phase I

Prior to commencement of this study the teacher and the researcher involved assigned a code number to each student to be used throughout the study in order to protect his/her identity.

At the beginning of Phase I, Test Form 2 of the SLEP test was administered as a pretest to all 30 participants in the study. The tests were scored and recorded individually on small cards. Each student's code number was recorded along with the mark he/she received. After all marks were collected they were arranged in order from highest to lowest.

To randomly assign these students to either a treatment group or a control group, the matching procedure was used. The two highest scores were placed in a hat and one randomly selected for a treatment group (Group A), the other for a control group (Group B). Then the next two highest scores were placed in a hat and chosen in a similar fashion. This procedure was continued until all subjects had been randomly assigned to either the treatment group or the control group (Borg & Gall, 1983; Kerlinger, 1973; Moore, 1983).

The above procedure was used in order to control variables such as age, gender, socioeconomic status and academic performance that could affect the results of this study; thus creating two matched groups (Borg & Gall, 1983; Kerlinger, 1973; Moore, 1983).

For the duration of this study, the students were instructed to work individually in order to avoid possible learning resulting from peer teaching (Bramley, 1979; Ehly & Larson, 1980; Pierce, Stahlbrand & Armstrong, 1984; Slavin, 1983; Wagner, 1982).

After having completed the pretest, group A was assigned to use the computers for 20 minutes a day for a period of two weeks, while group B was assigned to use pencil and paper for 20 minutes a day for the same two-week period (see Table 1).

At the end of Phase I, Test Form 3 of the SLEP test was administered to both groups as a posttest.

Phase II

Group A was assigned to use paper and pencil during their English class for the next two-week period, while group B was assigned to use the microcomputers (see Table 1). At the end of Phase II a computer-delivered questionnaire (see Appendix B) was administered to both groups to assess student opinion concerning the implementation of CALL in ESL classes.

A t-test (two-tail test) was used to make a statistical decision for each of the first two hypotheses. Scores obtained on the Likert scale and t-tests (one-tail tests) were used to address the third hypothesis.

2. Subjects

This class consisted of 30 French speaking students (19 females and 11 males) who were studying English as a second language. The students ranged in age from 12 to 14 years (see Table 2).

These students had experience with Macintosh Plus computers for a two week period in grade seven during the year preceding this study, at which time they were introduced to the microcomputer environment and the Macintosh software package, MacPaint. This exposure allowed for familiarization not only with the microcomputer environment but with the Macintosh computer as well; i.e., the use of icons and pull-down menus.

Throughout the study, the researcher met with the teacher at the end of every working day. They discussed the content and objectives to be achieved during the two weeks, student reaction to the two classroom conditions, progress of the students, solved any technical problems with the network, printed the students' files and stored the students' files on a hard drive.

Table 2

Student Distribution

Group A

Code #	Gender	Age (year | month)	
1	FEMALE	13	5
2	FEMALE	13	6
5	FEMALE	13	8
8	MALE	13	8
10	FEMALE	13	3
14	MALE	13	0
15	FEMALE	13	8
17	FEMALE	13	8
20	FEMALE	13	8
21	FEMALE	13	5
22	FEMALE	13	9
23	MALE	13	11
25	MALE	13	7
26	FEMALE	13	0
28	MALE	13	10

Group B

Code #	Gender	Age (year | month)	
3	MALE	13	6
4	FEMALE	13	1
6	FEMALE	12	11
7	FEMALE	13	10
9	FEMALE	13	3
11	MALE	13	9
12	MALE	13	0
13	FEMALE	13	6
16	MALE	13	10
18	FEMALE	13	10
19	FEMALE	13	6
24	MALE	13	7
27	MALE	13	10
29	FEMALE	12	11
30	FEMALE	13	10

3. Procedure

The researcher met with an elementary teacher at the French school research site in a suburban Toronto region. After lengthy discussions, the researcher approached the schoolboard and then the principal of the school, and arranged to carry out the study with their cooperation.

Once permission to conduct the study was granted, the teacher involved discussed the project with her students. They were informed that they would be part of an

experimental study designed to assess the implementation of CALL in ESL classes. Letters requesting the parents' approval for the children to participate in this research were sent home with the students two weeks before commencement of the study. Written parental approval was obtained for all subjects in the study (see Appendix C).

Participants in the study were thoroughly informed of the ethical considerations governing this research as well as the extent of their participation and the amount of cooperation expected from them. It was noted that they were to participate on a voluntary basis and that they could withdraw from this project any time during the study. They were told that strict confidentiality of their names and performance would be maintained during and after the study. The students were also informed that they would be writing two standarized tests and answering a computer-administered questionnaire during this study.

The concepts presented during the two-week period of the study were the same for both the treatment group and the control group. For the duration of the study both groups received 30 minutes of instruction per day followed by 20 minutes of creative writing. The students received identical classroom instruction in English but different methods (CALL or paper and pencil) of practicing creative writing.

The treatment group, consisting of 15 students, was divided into 3 groups of 5. Each day during English class, the instructor covered the scheduled concepts for that day after which five students at a time from the treatment group (Group A) used a Macintosh Plus computer, one student per computer, for a period of 20 minutes to do creative writing. The same process was then repeated by the other two groups. Meanwhile, the students in the control group (Group B) did creative writing using pencil and paper for a period of 20 minutes per day.

The concepts covered were as follows:

1. prefix "tri" as in tricycle, triplicate, etc.,
2. root word "meter",
3. verbs ending in a vowel and a "y" usually keep "y" when "er" and "ing" are added,
4. suffixes: ment, ing, ed, ation, ize, ary, ship, tion, ous, by, er, or, ate,
5. parts of speech: noun, verb, adjective, adverb, conjunction.

The following textbooks were used during the study.

1. Sheehan, Marlyn; Matte, L., Seguin, L., and MacKinnon, M. Combining Power Two, Centre Franco-Ontarien de Ressources Pedagogique. 1985.
2. Graves, C. and McClymont, C. Contexts Reading Skills Two. Nelson Canada. 1984.
3. Kusha, A., Webster, E.J.D., and Lewis, R. Spelling in Language Arts 8. Nelson, Canada. 1977.

4. Materials

Instructional Materials

Hardware

Five Macintosh Plus computers, each consisting of 1 MB of internal memory and one internal floppy disk drive, were used for this research project. Each computer was equipped with a mouse, a mouse pad and a keyboard.

Floppy disks were used by the participants to save their files after which they were collected by the researcher and saved on an external 20 MByte hard disk drive. One Imagewriter printer was used during this study to print the students' files.

Software

Throughout the study, a word processing program called Smoothtalker®, designed for creative writing by First Byte, Inc., was used on the Macintosh Plus computers. This program incorporates synthesized speech as a talking word processor for children.

Smoothtalker® has basic functions needed to manipulate text, and employs editing commands such as cut, copy and paste, which are part of the Macintosh environment. The writing box is also typical of the Macintosh with pull-down menus (see Figure 1). The user interacts with the screen through a keyboard and a mouse.

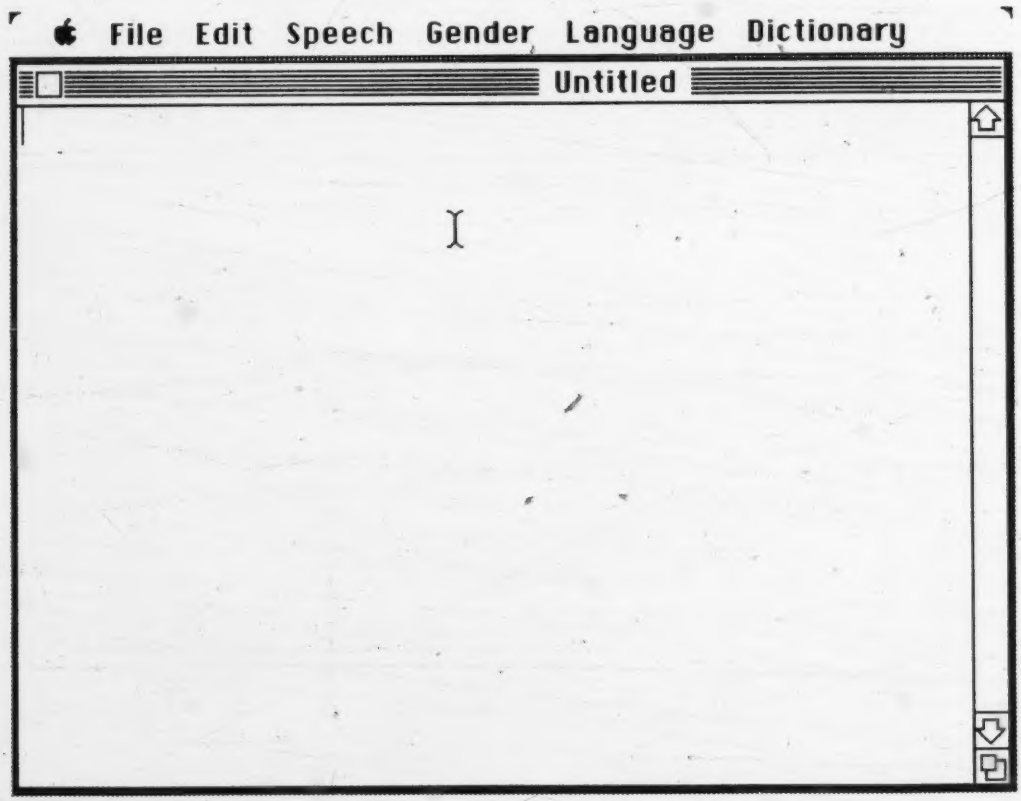


Figure 1: A view of the Smoothtalker® screen.

The Smoothtalker® program converts English text or numbers from both the keyboard and any text document into speech. Commands given via mouse, joystick or keyboard allow quick specification of speech, pitch, tone and volume for both male and female voices.

Smoothtalker® also has a feature whereby the user is given verbal instructions on the use of keys, along with a demonstration. It also provides ongoing verbal instruction as required.

Instruments

SLEP Standardized Test

The SLEP test is designed for students of grades seven through twelve enrolled in English as a Second Language (ESL) classes, whose native language is other than English. Section I of the SLEP test is a measure of listening comprehension. Section II measures reading comprehension including grammar and vocabulary (Educational Testing Service, 1984). Scores on section I were used to test the first Hypothesis while scores on section II were used to test the second Hypothesis.

Characteristics of the SLEP test

The SLEP test is a norm-referenced test containing 150 multiple-choice questions of eight different types and in two different forms (Test Form 2 and Test Form 3) which are parallel in format and content. As a norm-referenced test, SLEP provides researchers with a measuring tool to compare student results with those of other students in a similar situation over several categories such as gender, age, grade, language background, etc. (Educational Testing Services, 1984). The multiple choice format of this test eliminates the subjective judgements of the researcher and ensures reliability of scoring. The SLEP

test lends itself well to this particular study because the SLEP scale is sensitive to small gains in language skills and the duration of this project is four weeks.

This test takes 85 minutes to administer. It consists of two sections. Section 1 requires 40 minutes and section 2 requires 45 minutes. This includes the time for the practice questions. The subjects were provided with all the tools needed to write this test. The answer sheets were scored by the researcher using the scoring keys provided with the test.

Technical Characteristics of the SLEP test

The reliability of the SLEP test has been determined using the Kuder-Richardson formula (20). Reliability coefficients have been computed as .94 for the first section, .93 for the second, and .96 for the total test (Educational Testing Service, 1984). The equivalent form reliability of the SLEP have been computed as .84 for the first section and .80 for the second (Educational Testing Service, 1984).

The reliability of the sample test was also determined using the Kuder-Richardson formula (20). Reliability coefficients have been computed as .92 for the first section, .95 for the second, and .97 for the total test (Tuckman, 1972). The correlation coefficient for the sample test was also determined as .91 for the first section, .97 for the second, and .94 for the total test (Moore, 1983).

Student Opinion Questionnaire

A computer-administered questionnaire (see Appendix A) was developed by the researcher following methodology outlined by Borg & Gall (1983). The purpose of the questionnaire was to assess student opinion concerning the implementation of CALL as an instructional medium in ESL classes using a word processor to learn creative writing. The

sample consisted of 30 French-speaking students studying English as a second language. The questionnaire was administered to all 30 subjects participating in the study.

To locate and remove any ambiguities, the draft questionnaire was presented to the teacher involved in the study. Her comments were noted and corresponding changes were made. To establish construct validity, the questionnaire was presented to eleven other educators, including the principal of the school where the study took place. Most of these educators have had some teaching experience with grade eight students. They were asked to evaluate the completeness and adequacy of the topics presented in the questionnaire. Their responsed were in high agreement. Their recommendations were included when updating the questionnaire with the teacher involved in the study (Borg & Gall, 1983).

The teachers were also asked to examine the specific wording of the questions to establish content validity. Comments were used to revise. The revision instrument was administered to three other classes of French-speaking students (aged 12-14 years). This administration was used to establish the understandability of the instruments in the specific target population.

The questionnaire consisted of two sections. The first section contained 13 five-point Likert scale items, ranging from strongly agree to strongly disagree. The second section contained 5 opened-ended questions. The 13 Likert scale items were designed using a model developed by Johnston (1987), and guidelines outlined by Abdel-Gaid, Trueblood and Shrigly (1986). Some items were presented twice in reversed response format (e.g., items 3 and 10) in order to minimize response set problems and assess consistency of response (Tuckman, 1972). All of the questionnaire items were based on the third hypothesis presented in Chapter 1 (Borg & Gall, 1983).

The Macintosh-based questionnaire was interactive and easy to use. Both sections of the questionnaire followed the same format. The first screen presented the students with information explaining the purpose of the questionnaire. Participants were then

asked to enter their code number. The next screen prompted the students to answer a sample question resembling the actual questionnaire items. Questions 1 to 13 of the questionnaire were then presented in sequence, followed by open-ended questions 1 to 5. Students used a pull-down menu to choose the questions in order, jump ahead to different questions, or return to redo a previously answered question. The latest response to each question was stored on a floppy disk, and later retrieved by the researcher and printed (see Appendix B).

CHAPTER IV

RESULTS

1. Statistical Analysis

Three hypotheses were proposed for this study; two nondirectional hypotheses, H1 and H2, and one directional hypothesis, H3. To make a statistical decision for the first and second hypotheses (H1 and H2), the results of each section of Test Form 3 of the SLEP test were collected and scored, then analysed using a t-test (two-tail test) (Moore, 1983). This chapter presents the statistical results of the study and a summary of student opinion concerning the implementation of CALL in ESL classes.

To make a statistical decision for the third hypothesis, the Likert scale items of the student opinion questionnaire were collected and scored. The numerical scoring assigned to the Likert scale by the researcher was as follows: Strongly agree=5, Agree=4, Undecided=3, Disagree=2, Strongly Disagree=1. Scores greater than 3 were considered as a positive response, scores equal to 3 were considered as neutral, and scores less than 3 were considered as a negative response (Borg & Gall, 1983; Moore, 1983). Means for all items of the questionnaire for all 30 students were analyzed using a t-test (one-tail test) (Moore, 1983).

To carry out the statistical analysis of the data collected during this study, the program Statview 512+™ was used on a Macintosh Plus microcomputer. Students comments for open-ended items 1, 2, 3, 4 and 5 are presented in Appendix B.

2. Results

The purpose of this study was to determine the effectiveness of CALL methodology as implemented using the Smoothtalker® software to supplement classroom instruction to develop English listening and reading comprehension skills in ESL classes; and to assess student opinion concerning the use of CALL as an educational medium in ESL classes. Three major questions were posed and examined in this study:

1. Does the use of CALL to supplement teaching ESL to French speaking students enhance English listening comprehension?
2. Does the use of CALL to supplement teaching ESL to French speaking students enhance English reading comprehension?
3. What is student opinion concerning the use of CALL as an educational medium in ESL classes?

A test of an appropriate hypothesis was used to investigate each one of the above research questions. Before addressing the hypotheses, it was necessary to verify that some learning had occurred during the two instructional periods. This was tested by examining the differences between the pretest and posttest scores of both groups. Two *t*-tests (one-tail tests) were conducted to analyze the data collected from the listening and reading comprehension subscores of the pretest and posttest. A description of this analysis follows.

A *t*-test (one-tail test) was conducted to analyze the data collected from the pretest and posttest for Group A (Moore, 1983). The tabled *t* value for a one-tail test is $t\,(2) = 2.92$, $p < .05$ (Moore, 1983). Since the obtained $t\,(2) = 6.05$, $p < .05$, is larger than the tabled *t*, the results indicated significant mean difference was found between the pretest and the posttest score for Group A. Therefore Group A performed significantly better on the posttest than on the pretest at the level presented (see Table 3).

Table 3

t-test (one-tail test) analysis: Group A, pretest-posttest scores

Source	Pretest		Posttest		df=2 t
	Mean	Std. Dev	Mean	Std. Dev	
Listening	70.67	12.69	74.07	11.81	
Reading	68.93	17.24	75.07	14.50	
Total Test	69.80		74.57		
t-test					6.05

A t-test (one-tail test) was conducted to analyze the data collected from the pretest and posttest for Group B (Moore, 1983). The tabled t value for a one-tail test is t (2) = 2.92, p < .05 (Moore, 1983). Since the obtained t (2) = 3.11, p < .05, is larger than the tabled t, the results indicated significant mean difference was found between the pretest and the posttest score for Group B. Therefore Group B performed significantly better on the posttest than on the pretest at the level presented (see Table 4).

Table 4

t-test (one-tail test) analysis: Group B, pretest-posttest scores

Source	Pretest		Posttest		df=2 t
	Mean	Std. Dev	Mean	Std. Dev	
Listening	69.93	13.09	70.93	14.30	
Reading	68.53	16.32	72.07	16.60	
Total Test	69.23		71.50		
t-test					3.11

To summarize the results, the obtained data indicated a significant mean difference between the pretest scores and the posttest scores. An analysis of two t-tests revealed that students in Group A and Group B performed significantly better on the posttest at the level presented.

Research Questions

The first research question presented in Chapter I is:

Does the use of CALL to supplement teaching ESL to French speaking students enhance English listening comprehension?

To investigate the above question, the following hypothesis was tested:

H1: There is a significant difference in posttest scores obtained on the listening comprehension section of the Secondary Level English Proficiency test (SLEP) between two groups of French speaking students using CALL and pencil and paper for creative writing in ESL classes.

A *t*-test (two-tail test) was conducted to analyse the data collected from section 1 of Test Form 3 (Moore, 1983). The tabled *t* value for a two-tail *t*-test is $t\ (28) = 2.05$, $p < .05$ (Moore, 1983). Since the obtained $t\ (28) = .93$, $p < .05$ is smaller than the tabled value, it is not statistically significant at the level presented (Moore, 1983). The obtained *t* value indicated that no significant mean difference was found between the CALL methodology and the pencil and paper method on a measure of listening comprehension ($\bar{X}_A$=74.07 compared to $\bar{X}_B$=70.93) (see Table 5).

To summarize the results for the first research question, it was found that the CALL methodology was as effective as the paper and pencil method in developing the English listening comprehension skills of grade eight French speaking students in ESL classes. The computed *t* value was not significant at the level presented; therefore the above hypothesis was rejected.

Table 5

t-test (two-tail test) analysis: Section 1, Test Form 3

Source	Mean	Square of the sum	Sum of the squares	df=28 t
Group A	74.07	1234321	84241	
Group B	70.93	1132096	78336	
t-test				0.93

The second research question presented in Chapter I is:

Does the use of CALL to supplement teaching ESL to French speaking students enhance English reading comprehension?

To investigate the above question, the following hypothesis was tested:

H2: There is a significant difference in posttest scores obtained on the reading comprehension section of the Secondary Level English Proficiency test (SLEP) between two groups of French speaking students using CALL and pencil and paper for creative writing in ESL classes.

A t-test (two-tail test) was conducted to analyze the data collected from section 2 of Test Form 3 (Moore, 1983). The tabled t value for a two-tail t-test is $t\ (28) = 2.05$, $p < .05$ (Moore, 1983). Since the obtained $t\ (28) = 0.53$, $p < .05$ is smaller than the tabled value it is not statistically significant at the level presented (Moore, 1983). The obtained t value indicated that no significant mean difference was found between the CALL methodology and the paper and pencil method on a measure of reading comprehension ($\bar{X}_A$=75.07 compared to $\bar{X}_B$=72.07) (see Table 6).

To summarize the results for the second research question, it was found that the CALL methodology was as effective as the pencil and paper method in developing the

English reading and comprehension skills of grade eight French speaking students in ESL classes. The computed t value was not significant at the level presented; therefore the above hypothesis was rejected.

Table 6

t-test (two-tail test) analysis: Section 2, Test Form 3

Source	Mean	Square of the sum	Sum of the squares	df=28 t
Group A	75.07	1267876	87470	
Group B	72.07	1168561	81761	
t-test				0.53

The third research question examined in this study focused on student opinion concerning the implementation of CALL in ESL classes. The question posed in Chapter I is:

> What is student opinion concerning the use of CALL as an educational medium in ESL classes?

To investigate the above question, the following hypothesis was tested:

> H3: Student opinion concerning the use of CALL as an educational medium in ESL classes is more positive than student opinion concerning conventional instruction, as measured on the Likert scale.

The Likert scale items from part I of the questionnaire were collected and scored (see Table 7). The open-ended items from part II are presented in Appendix B.

Table 7

Likert scale Averages: Items 1-13, Part I

Part	Item	Group A Mean	Group B Mean	Both Groups Mean
I	1	3.60	3.47	3.54
I	2	3.67	3.67	3.67
I	3	4.07	3.73	3.90
I	4	3.27	3.60	3.44
I	5	2.53	3.07	2.80
I	6	2.13	3.27	2.70
I	7	3.33	3.47	3.40
I	8	2.40	2.67	2.54
I	9	3.33	3.60	3.47
I	10	3.80	3.80	3.80
I	11	2.67	2.93	2.80
I	12	2.93	3.00	2.97
I	13	3.00	3.40	3.20

Questionnaire items 1, 2, 4, 7 and 9 in part I and open-ended items 1, 2, 3 and 4 in part II focused on the features of CALL relative to creative writing. Item 1 in part I stated: I find it easier to revise text when using SmoothTalker than when using pencil and paper. Students from both groups agreed with the above statement (see Tables 8 and 9). Item 2 in part I stated: SmoothTalker helped me to develop a more positive attitude towards writing. Both groups were in agreement with this statement. Item 7 in part I stated: I express myself more clearly when using SmoothTalker for creative writing than

when using pencil and paper. Students in both groups were in agreement with this statement.

Item 4 in part I stated: I prefer to do creative writing using pencil and paper. The majority of students in both groups were in disagreement with this statement. Item 9 in part I stated: I did more creative writing while using SmoothTalker than while using pencil and paper. The majority of students in both groups were in agreement with this statement (see Tables 8 and 9).

The combined Likert scale average for items 1, 2, 4, 7 and 9 in part I for Group A (3.44) and Group B (3.56) indicated that student opinion was positive (see Table 8) for both groups concerning the use of CALL in creative writing. However, the obtained $t(4) = -7.19$, $p < .05$, indicated that a significant mean difference was found between Group A and Group B (Moore, 1983). Students in Group B rated the use of CALL in creative writing more positively than students in Group A.

Table 8

Likert scale Averages: Items 1, 2, 4, 7 and 9, Part I

Part	Item	Group A Mean	Group B Mean	Both Groups Mean
I	1	3.60	3.47	3.54
I	2	3.67	3.67	3.67
I	4	3.27	3.60	3.44
I	7	3.33	3.47	3.40
I	9	3.33	3.60	3.47

Table 9

Subject Distribution: Items 1, 2, 4, 7 and 9, Part I

Part	Item	Subjects	SA	A	U	D	SD	Likert scale average
I	1	30	7	10	7	4	2	3.54
I	2	30	10	8	6	4	2	3.67
I	4	30	3	5	5	10	7	2.57
I	7	30	7	10	4	6	3	3.40
I	9	30	8	8	6	6	2	3.47

Subject Distribution (percentage)

Part	Item	Subjects%	SA%	A%	U%	D%	SD%
I	1	100	23.33	33.33	23.33	13.33	6.67
I	2	100	33.33	26.67	20	13.33	6.67
I	4	100	10	16.67	16.67	33.33	23.33
I	7	100	23.33	33.33	13.33	20	10
I	9	100	26.67	26.67	20	20	6.67

Overall Attitude of Subjects (percentage)

Item	In Agreement%	Undecided%	Disagreement%
1	56.67	23.33	20
2	60	20	20
4	26.67	16.67	56.66
7	56.67	13.33	30
9	53.33	20	26.67

In the correlation matrix (see Table 10) if a student responded positively on the Likert scale for items 1, 2, 7 and 9, the same student should have responded negatively for item 4, and vice versa.

Table 10

Correlation Coefficient Between Items 1, 2, 4, 7 and 9, Part I

Items	Group A	Group B	Both Groups
1 & 2	.09	.87	.49
1 & 4	-.16	-.45	-.29
1 & 7	.58	.89	.73
1 & 9	.33	.75	.55
2 & 4	-.45	-.29	-.36
2 & 7	.30	.81	.57
2 & 9	.81	.92	.86
4 & 7	-.24	-.62	-.43
4 & 9	-.55	-.28	-.39
7 & 9	.39	.80	.64

Open-ended item 1 asked: What did you like about SmoothTalker? All 30 subjects answered this question. Of the 30 students, 21 made favorable comments, 6 made no comment and 3 indicated there was nothing to appreciate about the program (see Appendix B).

Open-ended item 2 asked: What did you dislike about SmoothTalker? All 30 subjects answered this question. Of the 30 students, 25 had nothing to suggest and 5 had positive comments (see Appendix B).

Open-ended item 3 asked: Do you think SmoothTalker helped you to express yourself better through creative writing? (Yes or No), (Why or Why Not?). All 30 subjects answered this question. Of the 30 students, 17 responded positively to the question, 6 were undecided and 7 responded negatively to the question (see Appendix B).

All 30 subjects answered open-ended item 4: Do you prefer using SmoothTalker or pencil and paper in English language classes? Of the 30 students, 21 preferred the CALL methodology, 4 were undecided and 5 preferred using pencil and paper (see Table 11).

Table 11

Subject Distribution: Item 4, Part II

Part	Item	Subjects	CALL	Undecided	Pencil and Paper
II	4	30	21	4	5
Subject Distribution (percentage)					
Part	Item	Subjects%	CALL%	Undecided%	Pencil and Paper%
II	4	100	70	13.33	16.67

To summarize the results, the obtained data for items 1,2 4,7 and 9 in part I and open-ended items 1, 2, 3 and 4 indicated that the majority of students in both groups favored using CALL methodology over the pencil and paper method to learn creative writing in ESL classes (see Tables 7, 8, 9, 10 and 11).

Questionnaire items 5, 8 and 11 focused on the acquisition of vocabulary. The Likert scale average obtained for item 5 of the questionnaire indicated a difference of

opinion between Group A and Group B (see Table 12). Item 5 stated: My English vocabulary has increased since using SmoothTalker. The Likert scale average for Group A (2.53) showed students in this group to be in disagreement with this statement while the Likert scale average for Group B (3.07) showed students to be in agreement with the statement. The combined Likert scale average for both groups (2.80) indicated that the majority of students were not in agreement with this statement (see Tables 12 and 13).

There were no significant differences between the two groups for items 8 and 11. Likert scale averages for these two items showed students in both groups to be in disagreement with the statements: In oral discussions I use new vocabulary acquired while using SmoothTalker, and; I have retained new vocabulary acquired while using SmoothTalker.

To summarize the results, the combined Likert scale averages for items 5, 8 and 11 in part I for Group A (2.53) and Group B (2.89) indicated that overall student opinion was negative for both groups with respect to acquiring new English vocabulary while using CALL (see Tables 12 and 13). However, the obtained t (2) = -3.89, $p < .05$, indicated that a significant mean difference was found between Group A and Group B (Moore, 1983). Student opinion for Group B was less negative than student opinion for Group A.

Table 12

Likert scale Averages: Items 5, 8 and 11, Part I

Part	Item	Group A Mean	Group B Mean	Both Groups Mean
I	5	2.53	3.07	2.80
I	8	2.40	2.67	2.54
I	11	2.67	2.93	2.80

Table 13

Subject Distribution: Items 5, 6, 8, 11, 12 and 13, Part I

Part	Item	Subjects	SA	A	U	D	SD	Likert scale average
I	5	30	0	7	13	7	3	2.80
I	8	30	0	4	13	8	5	2.54
I	11	30	0	9	9	9	3	2.80

Subject Distribution (percentage)

Part	Item	Subjects%	SA%	A%	U%	D%	SD%
I	5	100	0	23.33	43.33	23.33	10
I	8	100	0	13.33	43.33	26.67	16.67
I	11	100	0	30	30	30	10

Overall Attitude of Subjects (percentage)

Item	In Agreement%	Undecided%	Disagreement%
5	23.33	43.33	33.34
8	13.33	43.33	43.34
11	30	30	40

Table 14

Correlation Coefficient Between Items 5, 8 and 11, Part I

Items	Group A	Group B	Both Groups
5 & 8	.58	.24	.45
5 & 11	.49	.22	.40
8 & 11	.68	.36	.52

Questionnaire items 6, 12 and 13 in part I pertained to improvement in grammar, punctuation and spelling through the implementation of CALL in ESL classes. All 30 subjects answered the above items.

The Likert scale averages obtained for item 6 in part I indicated that Group A (2.13) disagreed with the statement: My English grammar has improved since using SmoothTalker; while group B (3.27) agreed with this statement (see Table 15). Likert scale averages for item 12 indicated that Group A (2.93) disagreed with the statement: My punctuation has improved since using SmoothTalker; while Group B (3.00) was undecided. Likert scale averages for item 13: My spelling has improved since using SmoothTalker, indicated that group A (3.00) was undecided while group B (3.40) was in agreement with the statement (see Tables 15 and 16).

To summarize the results, the combined Likert scale averages for items 6, 12 and 13 in part I for both groups indicated that the majority of students did not notice an overall improvement in grammar (2.70) or punctuation (2.97), but did notice an improvement in spelling (3.20) (see Tables 15 and 16). The obtained t (2) = -.75, $p < .05$, indicated that no significant mean difference was found between Group A and Group B (Moore, 1983).

Table 15

Likert scale Averages: Items 6, 12 and 13, Part I

Part	Item	Group A Mean	Group B Mean	Both Groups Mean
I	6	2.13	3.27	2.70
I	12	2.93	3.00	2.97
I	13	3.00	3.40	3.20

Table 16

Subject Distribution: Items 6, 12 and 13, Part I

Part	Item	Subjects	SA	A	U	D	SD	Likert scale average
I	6	30	0	9	9	6	6	2.70
I	12	30	2	10	7	7	4	2.97
I	13	30	4	9	9	5	3	3.20

Subject Distribution (percentage)

Part	Item	Subjects%	SA%	A%	U%	D%	SD%
I	6	100	0	30	30	20	20
I	12	100	6.67	33.33	23.33	23.33	12.33
I	13	100	13.33	30	30	16.67	10

Overall Attitude of Subjects (percentage)

Item	In Agreement%	Undecided%	Disagreement%
6	30	30	40
12	40	23.33	36.67
13	43.33	30	26.67

Table 17

Correlation Coefficient Between Items 6, 12 and 13, Part I

Items	Group A	Group B	Both Groups
6 & 12	.59	.57	.51
6 & 13	.43	.68	.54
12 & 13	.49	.56	.52

Questionnaire items 3 and 10 in part I pertained to the role of CALL and the teacher in ESL classes (see Tables 18 and 19). The obtained Likert scale averages for both groups for item 3 indicated that the majority of students disagreed with the statement: English teachers can be replaced by computers. The obtained Likert scale averages for both groups for item 10 indicated that the majority of students agreed with the statement: Computers cannot replace English teachers (see Tables 18 and 19).

To summarize the results, students in neither group felt that the English teacher could be replaced by the computer. However, the obtained $t = 5.88$, $p < .05$, indicated a significant mean difference in opinion between Group A and Group B (Moore, 1983). Students in Group A showed a higher preference for the teacher over the computer than students in Group B.

Table 18

Subject Distribution: Items 3 and 10, Part I

Part	Item	Subjects	SA	A	U	D	SD	Likert scale average
I	3	30	0	4	5	11	10	2.10
I	10	30	10	10	6	2	2	3.80
Subject Distribution (percentage)								
Part	Item	Subjects%	SA%	A%	U%	D%	SD%	
I	3	100	0	13.33	16.67	36.67	33.33	
I	10	100	33.33	33.33	20	6.67	6.67	
Overall Attitude of Subjects (percentage)								
Item			In Agreement%		Undecided%		Disagreement%	
3			13.33		16.67		70	
10			66.66		20		13.34	

Table 19

Likert scale Averages: Items 3 and 10, Part I

Part	Item	Group A Mean	Group B Mean	Both Groups Mean
I	3	4.07	3.73	3.90
I	10	3.80	3.80	3.80

Table 20

Correlation Coefficient Between Items 3 and 10, Part I

Items	Group A	Group B	Both Groups
3 & 10	-.60	-.75	-.66

To summarize the obtained results for the third research question, the combined Likert scale averages for items 1 to 13 indicated that the majority of students in Group A (3.13) and Group B (3.36) favored the use of CALL in ESL. Therefore, the third hypothesis was accepted. However, the obtained $t = -2.30$, $p < .05$, indicated a significant mean difference between Group A and Group B (Moore, 1983). Students in Group B rated the use of CALL as an educational medium in ESL more positively than students in Group A.

Microcomputer Experience

Open-ended item 5 was presented to determine if the students who participated in this study had previous exposure to microcomputers. Students were asked: Have you ever used a computer before participating in this study? (Yes or No?) and (In what areas?). A description of the obtained results on this item follows.

All 30 subjects answered this item; 6 had no experience with microcomputers. Of those students who had experience, 6 had been using microcomputers for word processing and games, 1 for programming and 17 for games only (see Table 21).

Table 21

Microcomputer Experience: Item 5, Part II

Part	Item	Subjects	Word processing and Games	Games	Coding	No Experience
II	5	30	6	17	1	6
Subject Distribution (percentage)						
Part	Item	Subjects%	Experience%		No Experience%	
II	5	100	80		20	

To summarize these results, it was found that the majority of students (80%) had some previous experience with microcomputers before participating in this study (see Table 21).

CHAPTER V

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

This chapter consists of three major sections; discussion, conclusion, and recommendations. The first section discusses the obtained results from Chapter IV. The second section presents conclusions derived from these results. The third section offers recommendations for further research of CALL in ESL classes.

1. Discussion

Achievement

Young (1988) stated that a CALL medium that allows learners control over the outcome of the activities is beneficial for language acquisition. Whereas CALL has typically been implemented in the form of drill and practice software, this study was carried out to investigate the use of word processing as an instructional medium of CALL in ESL classes. It was felt that the word processor would be more effective than pencil and paper in enhancing creativity and experimentation with the language.

The study compared scores obtained on the SLEP test by two different groups; one using the CALL methodology (Group A) and the other using pencil and paper (Group B). Both groups received the same English instruction from the same teacher in addition to the CALL or paper and pencil. The results from sections 1 and 2 of Test Form 3 indicated that each group learned significantly during the two weeks but the increase was the same for both groups on both reading and listening comprehension skills.

Attitude

Student opinion concerning the use of a word processor as a CALL medium in ESL classes was assessed through a computer-administered questionnaire. A discussion of the opinions expressed in the questionnaire is presented below.

The majority of students felt that the use of CALL fostered creative writing. These results support similar findings by Newman (1984) who stated that word processing allowed writers to be more creative when engaging in the writing process. The student opinion questionnaire indicated that students preferred the use of CALL methodology to the use of pencil and paper to learn creative writing in ESL classes and that the CALL methodology helped students develop a more positive attitude towards writing. Results also indicated that students preferred revising text using the word processor to revision using pencil and paper. This supports other observations by Newman (1984) who stated that writing with a word processor allows students to revise text without expending too much time and effort writing and rewriting. Results indicated that student opinion in Group B was more positive than student opinion in Group A. This may possibly result from the more recent exposure to the CALL methodology by students in Group B prior to answering the questionnaire.

Results indicated that overall student opinion was negative for both groups with respect to acquiring new English vocabulary while using CALL. The obtained results indicated a significant mean difference between Group A and Group B. Student opinion for Group B was less negative than student opinion for Group A. Again, students in Group B had more recent exposure to the CALL methodology than students in Group A prior to answering the questionnaire.

The majority of students did not notice an overall improvement in grammar and punctuation but did notice an improvement in spelling. These results may possibly be

attributed to the short duration of the study. No significant mean difference was found between Group A and Group B.

Neither group felt that teachers could be replaced by computers. These results complement and support the latest studies which state that in creative writing there must be reaction and feedback from the language teacher (Balajthy, 1986; Graves, 1983; Jex, 1988). Students in Group A showed a higher preference for the teacher over the computer than students in Group B. This could be attributed to the fact that students in Group B spent the last two weeks prior to answering the questionnaire working at the computer.

2. Conclusion

The study showed that CALL and the pencil and paper methods did not differ in developing listening and reading comprehension in ESL classes. There are at least three hypotheses to account for the lack of results. First, CALL is no more effective as a supplement to classroom instruction than is paper and pencil methodology. Although this hypothesis is not supported by the researh on the effectiveness of CAI, there is little research on supplementary CALL to serve as a basis for comparison. This hypothesis should receive further attention in future research.

It may also be hypothesized that the instructional time devoted to CALL (200 minutes) may not have been long enough to bring about a measurable change in reading or listening comprehension. This hypothesis is confounded by the fact that the study ventured into two new areas, including the use of native French speakers and the focus on creative writing skills. Further research should investigate learning ESL as a function of time.

Finally, one could hypothesize that the learning that did occur was attributable to the work of the classroom instructor or pretest sensitization. The relative contributions of

the classroom instructor and computer should be separated in future research studies. Results of such studies will better enable us to apportion instruction between the teacher and computer.

The questionnaire also indicated that the CALL methodology was well accepted by students in the ESL classroom, and that students' attitudes towards writing were more positive when using CALL. ESL teachers should consider implementing the CALL environment in their language classes. In order to do this as effectively as possible, teachers should become familiar with the most recent literature on the implementation of CALL in the ESL classroom. Teachers should also be familiar with available hardware and software.

To facilitate the implementation of CALL in the ESL classroom administrators should consider acquiring user friendly hardware and software that incorporates enactive, iconic and symbolic representation. Administrators should also provide in-service to familiarize teachers with the use of the hardware and software to be implemented in the ESL classroom.

Students favored the CALL methodology for creative writing as it allowed them more freedom to experiment with the language. Students also preferred the word processor for revision purposes, as it demanded less time and effort for writing and rewriting. ESL teachers should teach their students keyboarding skills before implementing the CALL environment. This will eliminate frustration on the part of the student and increase productivity in the computer time available.

Although an improvement in spelling was perceived by the majority of students who paticipated in the study, no significant increase in vocabulary through the use of the word processor, nor any improvement in punctuation or grammar. These results could possibly be contributed to the short duration of the study. Parents could provide further practice in ESL creative writing by considering user friendly hardware and appropriate

software when making computer purchases for the home, and encouraging the use of word processing packages versus games.

Students would seem to appreciate interaction with the teacher as well as the computer. The majority of students indicated that they did not feel the teacher could be replaced by the computer. This would suggest that ESL teachers should not fear replacement by computers. Rather, they should welcome the CALL environment as a teaching and learning medium in the ESL classroom.

In summary, this study revealed that the CALL methodology is well accepted by students in the ESL classroom and that it fosters creative writing. Therefore, educators and administrators should consider the CALL enviromnent as a possible instructional medium in the ESL classroom.

3. Recommendations for Future Research

This section presents various recommendations for future research in the area of CALL and second language learning. These recommendations address scope and duration of study, and the computer writing environment.

This study was limited to one grade eight class of French speaking students. Future research using the CALL methodology presented in this study should assess second language acquisition across various grade levels and among various linguistic groups.

Further research should consider a period of more than four weeks. It is also recommended that a keyboarding course be presented to students prior to commencement of the study to allow maximum benefit of time available for creative writing.

While adapting the same methodology used in this study, the added dimension of dyadic learning would further enhance language acquisition. Research indicates that peer

tutoring within the computer writing environment has a positive effect on learning and enhances student achievement (Lieberman & Krendl, 1987; Pierce, Stahlbrand & Armstrong, 1984; Slavin, 1983; Wagner, 1982; Young, 1988).

This study assessed student opinion concerning the implementation of CALL in the ESL classroom. Further research should consider questionnaires that assess the opinion of the ESL teacher towards the implementation of CALL as an instructional medium.

References

Abdel-Gaid, S., Trueblood, C. R., & Shrigley, R. L. (1986). A systematic procedure for constructing a valid microcomputer attitude scale. Journal of Research in Science Teaching, 23 (9), 823-839.

Alessi, S. M., & Trollip, S. R. (1985). Computer-based instruction: Methods and development. New Jersey: Prentice-Hall, Inc.

Allen, V. G. (1986). Developing contexts to support second language acquisition. Language Arts, 63 (1), 61-66.

Balajthy, E. (1986). Using microcomputers to teach spelling. Reading Teacher, 39(5), 438-443.

Balajthy, E. (1987). Computers and reading language arts: Will we try to cure the problem with turpentine? Computers in the Schools, 4 (1), 67-69.

Bangert-Drowns, R., Kulik, J. & Kulik, C. (1985). Effectiveness of computer-based education in secondary schools. Journal of Computer-Based Instruction, 12(3), 59-68.

Barrs, M. (1983). The new orthodoxy about writing: Confusing process and pedagogy. Language Arts, 60(7), 829-840.

Beard, R. (1984). Children's writing in the primary school. Kent: Hodder and Stoughton Ltd.

Bennett, B. (1983). Writers and their writing, 15 to 17. In A. Freedman, I. Pringle, & J. Yalden (Eds.), Learning to write: First language/second language (p. 190-206). London: Longman.

Bereiter, C. & Scardamalia M. (1983). Does learning to write have to be so difficult? In A. Freedman, I. Pringle, & J. Yalden (Eds.), Learning to write: First language/second language (p. 20-33). London: Longman.

Betza, R. E. (1987). Online: Computerized spelling checkers: Friends or foes? Language Arts, 64 (4), 438-443.

Borg, W. R. & Gall, M. D. (1983). Educational research: An introduction. New York: Longman Inc.

Boutwell, M. A. (1983). Reading and writing process: A reciprocal process. Language Arts, 60 (6).

Bramley, W. (1979). Group tutoring: Concepts and case studies. London: Kogan Page Limited.

Britton, J. (1983). Shaping at the point of utterance. In A. Freedman, I. Pringle, & J. Yalden (Eds.), Learning to write: First language/second language (p. 13-19). London: Longman.

Bruner, M. (1987). Brief: Using knuckles to help solve writer's block. Language Arts, 64 (4), 444-446.

Bruner, J. S. (1966). Toward a theory of instruction. Cambridge: Harvard University Press.

Campbell, D. T. & Stanley, J. C. (1966). Experimental and quasi-experimental designs for research. Boston: Houghton Mifflin Company.

Chomsky, N. (1986). Knowledge of language. New York: Praeger Publishers.

Chomsky, N. (1972). Language and mind. Massachusetts: MIT Press.

Clark, J. D. (1988). Toward a research and development strategy for computer-assisted language learning. CALICO Journal, 5 (3), 5-23.

Cook, V. J. (1985). Bridging the gap between computers and language teaching. In P. Skehan (Ed.), Computers in english language teaching (p. 13-23). Oxford: Pergamon Press.

Curriculum guideline for the teaching of English in French-language schools, (1985). Ontario Ministry of Education. Toronto, Ontario.

Daiute, C. (1985). Writing and computers. Massachusetts: Addison-Wesley Publishing Company.

Dalgish, G. M. (1987). Some uses of computers in teaching English as a second language: The issue of control. Computers in the Schools, 4 (1), 81-93.

Davies, G. (1982). Computers, language and language learning. London: Centre for Information on Language Teaching and Research.

Dear, B. L. (1988). Hypercard what is it? BYTE, Mac Special Edition, 71-74.

DeGroff, L., & Leu, D. J. (1987). An analysis of writing activities. Written Communication, 4 (3), 253-268.

DiPardo, A. & Freedman, S. (1988) Peer response groups in the writing classroom: Theoretic foundations and new directions. Review of Educational Research, 58(2), 119-149.

Educational Testing Service. (1987). Secondary level English proficiency test. Princeton.

Ehly, S. W., & Larsen, S.C. (1980). Peer tutoring for individualized instruction. Boston: Allyn and Bacon, Inc.

English curriculum guideline: Intermediate and senior divisions (Grades 7 - 12). (1987). Ontario Ministry of Education.

Firschein, O., & Fischler, M. A. (1987). Intelligence: The eye, the brain, and the computer. Massachusetts: Addison-Wesley Publishing Company.

Frey, B. J. (1976). TESL: Basic help for teaching English as a second language. Tucson: Communication Skill Builders, Inc.

Fox, J. (1985). Humanistic CALL: Teacher's needs and learners' needs in the design and use of computer-assisted language learning systems. In P. Skehan (Ed.), Computers in English language teaching (p. 91-97). Oxford: Pergamon Press.

Gage, N. L., & Berliner, D. C. (1984). Educational psychology, (3rd ed). Boston: Houghton Mifflin Company.

Graves, D. H. (1983). The growth and development of first-grade writers. In A. Freedman, I. Pringle, & J. Yalden (Eds.), Learning to write: First language/second language (p. 54-66). London: Longman.

Graves, D. H. (1983). Writing: Teachers & children at work. New Hampshire: Heinemann Educational Books.

Harrison, B. T. (1983). Learning through writing: Stages of growth in English. Windsor, Berks: The NFER-Nelson Publishing Company Ltd.

Hedley, C., & Hedly, W. E. (1984). Using computer software to teach writing to children who have difficulty forming letters. Journal of Reading, Writing, and Learning Disabilities International, 1 (1), 17-19.

Hedley, C. N. (1985). Creative writing and computers for children with learning disorders. Journal of Reading, Writing and Learning Disabilities International, 1 (3), 20-23.

Higgins, J. (1982). The use of the computer in English language teaching. In G. Davies (Ed.), Computers, language and language learning (p. 25-30). London: Centre for Information on Language Teaching and Research.

Higgins, J., & Johns, T. (1984). Computers in language learning. London: Collins ELT.

Horton, S. R. (1982). Thinking through writing. Baltimore: The Johns Hopkins University Press.

Icabone, D., & Hannaford, E. (1986). A comparison of two methods of teaching unknown reading words to fourth graders: Microcomputer and tutor. Educational Technology, 26 (2), 36-39.

Irwin, M. E. (1987). Connections: Young children, reading, writing and computers. Computers in the Schools, 4 (1), 37-51.

Jex, W. (1988). Microcomputers and English language instruction: A few years later. CALICO Journal, 5 (3), 84-89.

Johnston, V. M. (1987). Attitudes towards microcomputers in language learning: 1. Pupils and software for language development. Educational Research, 29 (1), 47-54.

Kameen, T. (1983). Syntactic skill and ESL writing quality. In A. Freedman, I. Pringle, & J. Yalden (Eds.), Learning to write: First language/second language (p. 162-170). London: Longman.

Kaplan, R. B. (1983). Contrastive rhetorics: Some implications for the writing process. In A. Freedman, I. Pringle, & J. Yalden (Eds.), Learning to write: First language/second language (p. 139-161). London: Longman.

Kerlinger, F. N. (1973). Foundations of behavioral research (2nd ed.). New York: Holt, Rinehart & Winston.

Kirby, D. R., & Kantor, K. J. (1983). Toward a theory of developmental rhetoric. In A. Freedman, I. Pringle, & J. Yalden (Eds.), Learning to write: First language/second language (p. 87-97). London: Longman.

Klein, W. (1986). Second language acquision. Cambridge: Cambridge University Press.

Kulik, J., Kulik, C. & Cohen, P. (1980). Effectiveness of computer-based college teaching: A Meta-analysis of Findings. Review of Educational Research, 50(4), 525-544.

Langdon, D. G. (1980). PLATO. The Instructional Design Library, 30, 3-59.

Language in use, Process integration: Holistic approach. (1985). CFORP.

Lieberman, D. A., & Krendl, K. A. (1987). Children and computers: A review of research literature, 1984-1986. Department of Telecommunications, Indiana University, Bloomington, IN.

Lundsteen, S. W. (1976). Help for the teacher of written composition: New directions in research. Illinois: ERIC Clearinghouse on Reading and Communication Skills.

Meara, P. (1985). Lexical Skills and CALL. In P. Skehan (Ed.), Computers in English language teaching (p. 83-89). Oxford: Pergamon Press.

Mehan, H., Miller-Souviney, B., & Riel, M. (1984). Research currents: Knowledge of text editing and control of literacy skills. Language Arts, 61 (5), 510-515.

Moore, G. W. (1983). Developing and evaluating educational research. Boston: Little, Brown and Company.

Newman, J. M. (1984). Language learning and computers. Language Arts, 61 (5), 494-497.

Niemiec, R., Samson, G., Weinstein, T. & Walberg, H. (1987). The effects of computer based instruction in elementary schools: A quantitative synthesis. Journal of Research on Computing in Education, 20(2), 85-103.

Odell, L. (1983). Redefining maturity in writing. In A. Freedman, I. Pringle, & J. Yalden (Eds.), Learning to write: First language/second language (p. 98-114). London: Longman.

Ontario Curriculum Institute. (1983). English as a second language for French speaking students in secondary schools. Toronto, Ontario.

Papert, S. (1980). Mindstorms: Children, computers, and powerful ideas. New York: Basic Books.

Petruk, M. (1986). Microcomputers in Alberta schools. Media and Technology Branch: Alberta Education.

Petty, W. T., & Bowen, M. (1967). Slithery snakes and other aids to children's writing. New Jersey: Prentice Hall, Inc.

Phillips, M. (1985). Logical possibilities and classroom scenarios for the development of CALL. In P. Skehan (Ed.), Computers in English language teaching (p. 25-45). Oxford: Pergamon Press.

Pierce, M., Stahlbrand, K. & Armstrong, S. (1984). Increasing student productivity through peer tutoring programs. Austin: Pro-Ed.

Raimes, A. (1983). Anguish as a second language? Remedies for composition teachers. In A. Freedman, I. Pringle, & J. Yalden (Eds.), Learning to wite: First language/second language (p. 258-272). London: Longman.

Raschio, R. & Lange, D. (1984). A discussion of the attributes, role, and uses of CAI materials in foreign languages. Journal of Computer-based Instruction, 11(1), 22-27.

Rathje, L. (1986). Software reviews. The Computing Teacher, April 1986, 49-51.

Rope, A. (1985). CALLing the tune: Teacher involvement in CALL development. In P. Skehan (Ed.), Computers in English language teaching (p. 65-68). Oxford: Pergamon Press.

Samway, K. Formal evaluation of children's writing: An incomplete story. Language Arts, 64 (3), 289-298.

Skehan, P. (1985). A primer in CALL technology. In P. Skehan (Ed.), Computers in English language teaching (p. 121-136). Oxford: Pergamon Press.

Slavin, R. E. (1983). Student team learning: An overview and practical guide. Washington: Nea Professional Library.

Squire, J. R. (1983). Instructional focus and the teaching of writing. In A. Freedman, I. Pringle, & J. Yalden (Eds.), Learning to write: First language/second language (p. 227-236). London: Longman.

Swett, S. (1986). Cross-cultural computing. Electronic Learning, January, 1986, 48-52, 73.

Tuckman, B. W. (1972). Conducting educational research. New York: Harcourt Brace Jovanovich, Inc.

Vygotsky, L. (1986). Thought and language. Cambridge: The MIT Press.

Vygotsky, L. S. (1978). Mind in society. Cambridge: Harvard University Press.

Wagner, L. (1982). Peer teaching: Historical perspectives. Westport: Greenwood Press.

Wilkinson, A. (1983). Assessing Language Development: the Credition Project. In A. Freedman, I. Pringle, & J. Yalden (Eds.), Learning to write: First language/second language (p. 67-86). London: Longman.

Wolf, D. P. (1985). Flexible texts: Computer editing in the study of writing. New Directions for Child Development, 28 (6), 37-53.

Young, R. (1988). Computer-assisted language learning conversions: Negotiating an outcome. CALICO Journal, 5 (3), 65-83.

Appendix A

Student Opinion Questionnaire

Student Opinion Questionnaire

The purpose of this questionnaire is to gain your feedback on the use of computers in English language development classes. The questionnaire consists of two parts. Part I contains 13 items to be evaluated, and Part II consists of 5 open-ended questions.

PART I

Please circle the letters on the right which best indicate how you feel about each statement. (SA strongly agree, A agree, U undecided, D disagree, SD strongly disagree).

1.	I find it easier to revise text when using SmoothTalker than when using pencil and paper.	SA A U D SD
2.	SmoothTalker helped me to develop a more positive attitude towards writing.	SA A U D SD
3.	English teachers can be replaced by computers.	SA A U D SD
4.	I prefer to do creative writing using pencil and paper.	SA A U D SD
5.	My English vocabulary has increased since using SmoothTalker.	SA A U D SD
6.	My English grammar has improved since using SmoothTalker.	SA A U D SD
7.	I express myself more clearly when using SmoothTalker for creative writing than when using pencil and paper.	SA A U D SD
8.	In oral discussions I use new vocabulary acquired while using SmoothTalker.	SA A U D SD
9.	I did more creative writing while using Smooth Talker than while using pencil and paper.	SA A U D SD
10.	Computers cannot replace English teachers.	SA A U D SD

11.	I have retained new vocabulary acquired while using SmoothTalker.	SA A U D SD
12.	My punctuation has improved since using SmoothTalker.	SA A U D SD
13.	My spelling has improved since using Smoothtalker.	SA A U D SD

PART II

Please answer the following questions to the best of your ability.

1. What did you like about SmoothTalker?

2. What did you dislike about SmoothTalker?

3. Do you think SmoothTalker helped you to express yourself better through creative writing?

   A. Yes or No?

   B. Why or Why Not?

4. Do you prefer using SmoothTalker or pencil and paper in English language classes (Yes or No)?

5. Have you ever used a computer before participating in this study?

   A. Yes or No?

   B. In what areas (i.e., games, math, word processing, etc.)?

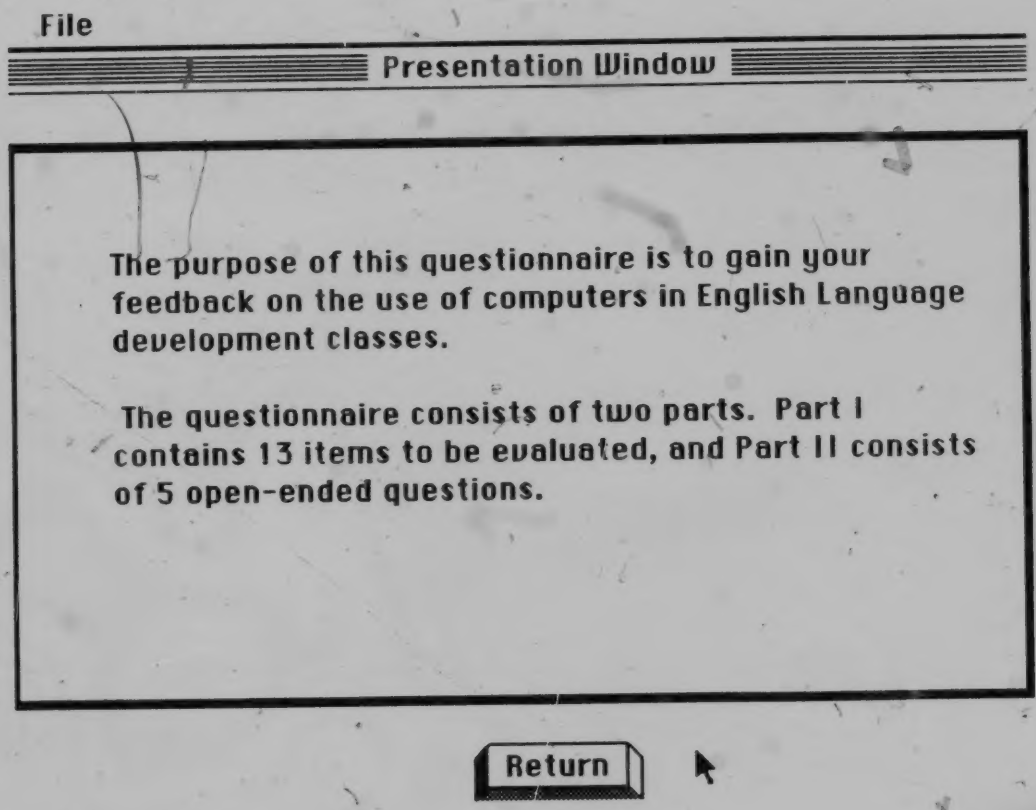
Appendix B

On-line Questionnaire

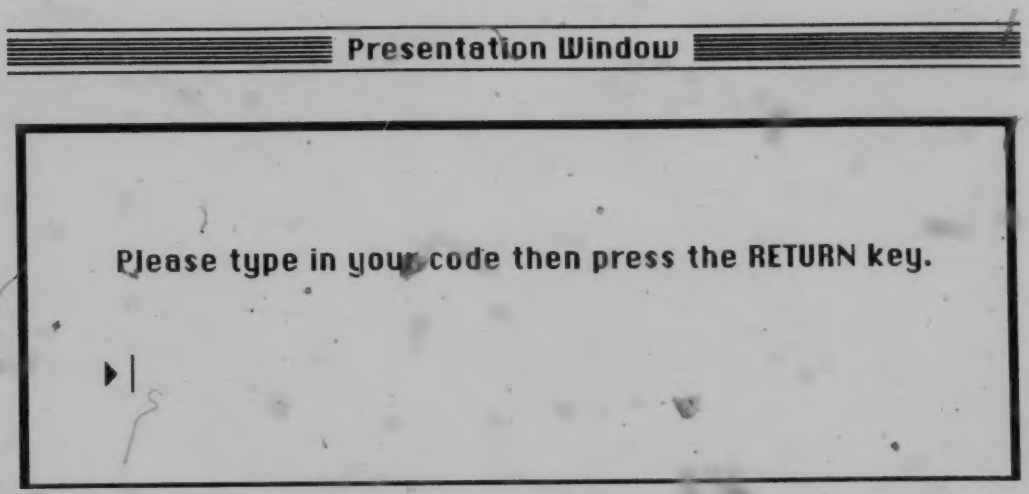
On-line Questionnaire

Before administering the on-line questionnaire, the teacher explained the procedure to her students in both English and French. They were instructed to answer the questions to the best of their knowledge. No time limit was set by the researcher or the instructor, hence students did not feel rushed while answering the questionnaire.

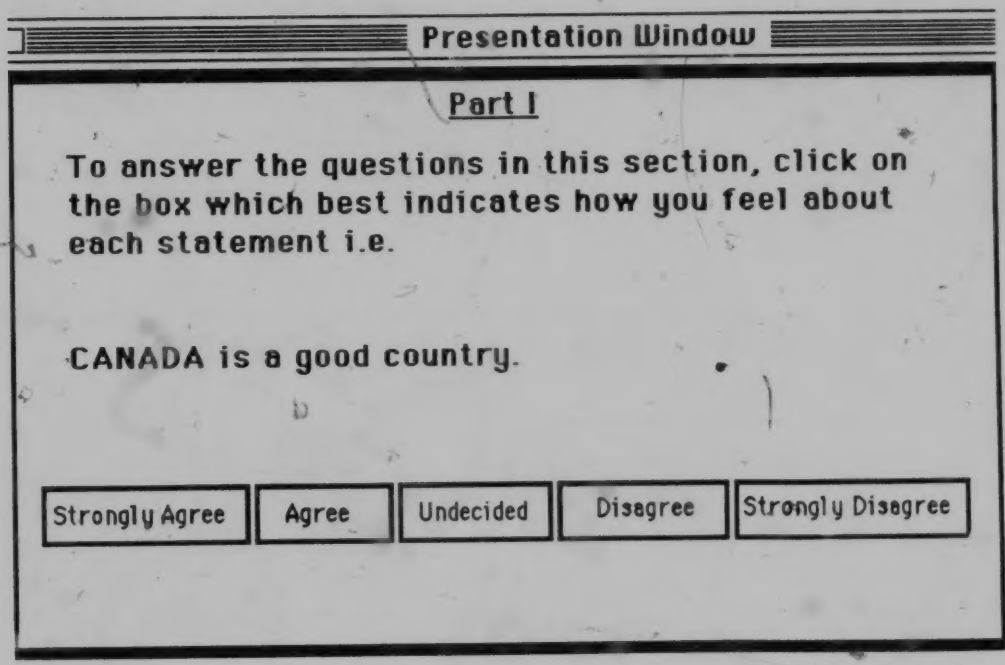
To start, participants were guided through an introductory screen explaining the purpose and the format of the questionnaire.


File
Presentation Window
The purpose of this questionnaire is to gain your feedback on the use of computers in English Language development classes.
The questionnaire consists of two parts. Part I contains 13 items to be evaluated, and Part II consists of 5 open-ended questions.
Return

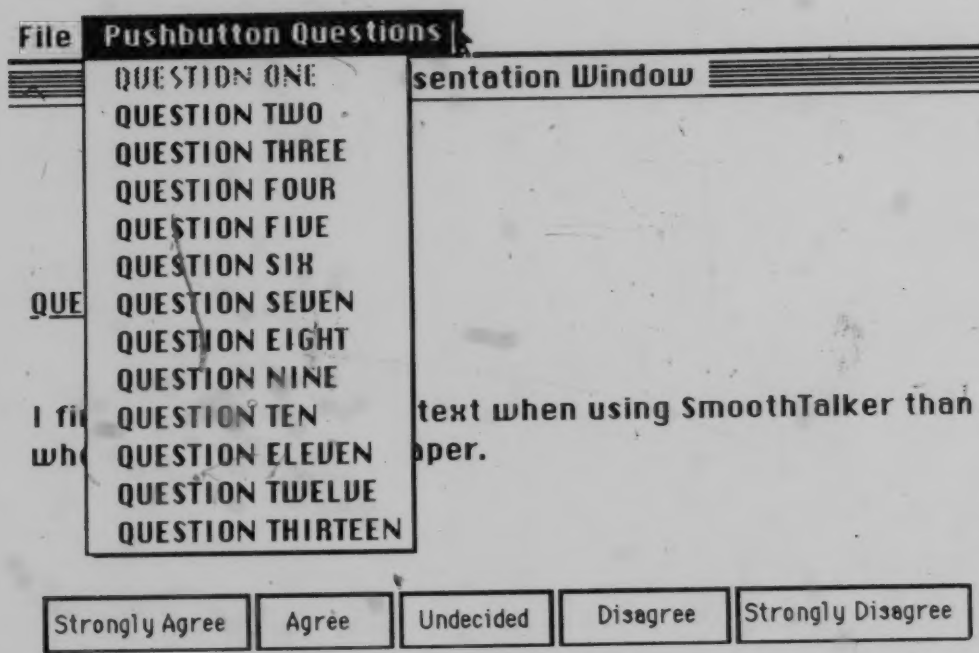
At the beginning of the questionnaire participants were asked to enter their code number.



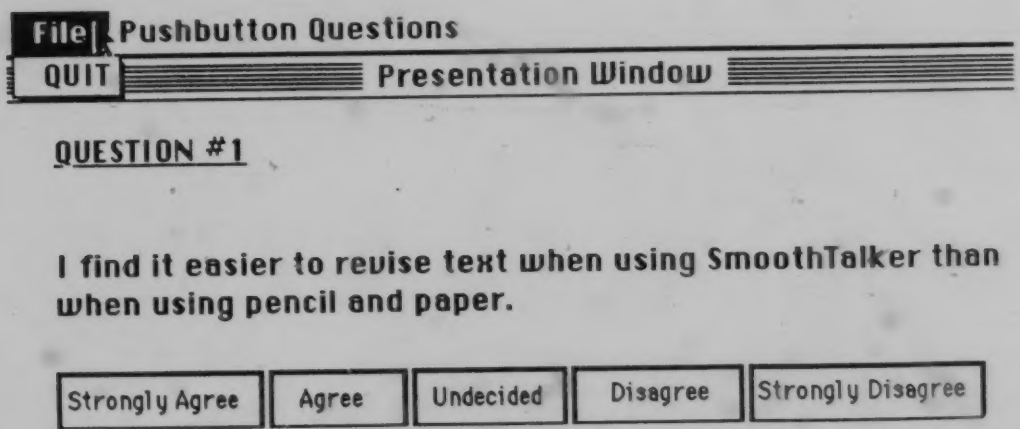
After entering their code, students were presented with a sample screen.


Presentation Window
Part I
To answer the questions in this section, click on the box which best indicates how you feel about each statement i.e.
CANADA is a good country.
Strongly Agree
Agree
Undecided
Disagree
Strongly Disagree

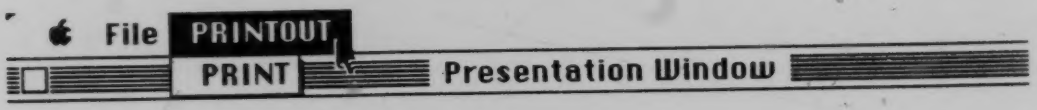
The sample screen was followed by questions 1 to 13, presented in sequence with the help of a pull-down menu. Students could answer questions, jump ahead to different questions, and return to redo previously answered questions as often as they wished.



The flexibility of the on-line questionnaire allowed the students the freedom to think about each question and quit whenever they felt like it.

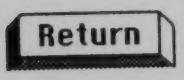


Participants latest responses to the questionnaire were stored on floppy disks as the students entered them. They were then retrieved by the researcher and printed.



DISPLAY OF RESULTS (student #1):

QUESTION#1: STRONGLY AGREE
QUESTION#2: STRONGLY AGREE
QUESTION#3: UNDECIDED
QUESTION#4: AGREE
QUESTION#5: UNDECIDED
QUESTION#6: AGREE
QUESTION#7: STRONGLY AGREE
QUESTION#8: UNDECIDED
QUESTION#9: STRONGLY AGREE
QUESTION#10: AGREE
QUESTION#11: AGREE
QUESTION#12: AGREE
QUESTION#13: STRONGLY AGREE



All 30 students who participated in this study answered all the items of this questionnaire. A summary of the students answers to the open-ended questions are presented below.

Students Comments - Open Ended Questions

1) What did you like about SmoothTalker?

A positive response was given by 21 subjects. Their comments were as follows:

I was able to express myself without being afraid of people laughing at my writing because when I write it's serious and I write about serious things.

I find that SmoothTalker helped me with my spelling because you have to think a lot more to write a word.

It was not frustrating like paper and pencil because I did not have to use erasers and mess up my paper.

You could make the computer talk.

I could often go back to any part of my text to change anything I didn't like.

It was easy to use.

All the different things it does.

It is fun to use.

I like the freedom to write and change what I wrote.

I enjoyed typing on the keyboard.

It's more easy to see your mistakes.

I got to type my compositions and correct my own mistakes.

I enjoyed writing what I learned and correcting my mistakes.

It was easy to see my mistakes on the screen.

I find that it was easy to change my ideas.

It helped me to use new ideas.

Everything.

It was fun listening to the computer reading my story.

I wrote more stories.

It was fun to write with SmoothTalker.

I paid more attention to my spelling.

Of those students who ansered this open-ended question, 6 answered " I don't know", and 3 gave a negative answer. Their comments were as follows:

Not much I just liked going on the computer to waste some time.

Nothing.

I don't like working with a machine.

2) What did you dislike about SmoothTalker?

Of the 30 students who answered this item, 25 subjects answered "nothing", only 5 students presented some criticism. Their comments were as follows:

Too many steps to go through.

It did not speak good English.

It took me time to use the keyboard.

I wasted lots of time looking for the keys to press.

It is difficult to use a computer.

3) Do you think SmoothTalker helped you to express yourself better through creative writing? (Yes or No?)___(Why or Why Not?)

All 30 subjects answered this open-ended question, 17 were in agreement with the statement, 6 were undecided and 7 were in disagreement. Of the 17 subjects who were in agreement they gave the following common reasons:

Explore new ideas.

Correct their own mistakes.

Listening to the computer reading their stories.

Paying more attention to spelling.

The 7 subjects who were in disagreement gave the following common reasons:

Spending lots of time looking for keys while typing.

Too many steps to follow before and after writing.

Not enough time on the computer.

4) Do you prefer using SmoothTalker or pencil and paper in English language classes?

All 30 subjects answered this open-ended question. Of the 30 students who answered this open-ended question, 21 choose SmoothTalker, 4 were undecided, and 5 preferred using pencil and paper.

5) Have you ever used a computer before participating in this study? (Yes or No?)___(In what areas?)

All 30 subjects answered this open-ended question, 24 stated that they had used a microcomputer before participating in this study and 6 have never used a microcomputer before. Of the 24 students who were familiar with microcomputers, 6 have used them for word processing and games, 1 for programming, and 17 subjects stated that they have used them for games only.

Appendix C

Letter to the Parents

le mardi 1 novembre 1988

Chers parents,

Dès le mois de novembre, le directeur ainsi que (nom du professeur) me permettent de faire une recherche sur l'utilisation des ordinateurs dans l'enseignement de l'anglais dans la classe de huitième année. Cette étude débutera le 14 novembre 1988 et terminera le 9 décembre 1988.

Les élèves utiliseront des ordinateurs "Macintosh Plus" dans leur cours d'anglais pendant une durée de 4 semaines. Le travail quotidien des enfants ne sera pas touché et les résultats de cette recherche demeureront confidentiels. De plus, ceux qui participent à ce projet auront l'occasion de se servir d'un ordinateur et d'augmenter leurs connaissances dans ce domaine.

Veuillez remplir le formulaire ci-inclus et le renvoyer à (nom du professeur) avant le 4 novembre 1988. Si vous désirez plus de reseignements au sujet de cette recherche, vous pourrez me contacter pendant la journée au numéro 246-2522.

Merci de votre collaboration dans ce projet.

Bien à vous,

Walid G. Haddad

Oui, _____ a la permission de participer à l'étude de l'utilisation des ordinateurs dans l'enseignement de l'anglais pendant son cours d'anglais avec (nom du professeur).

Non, _____ n'a pas la permission de participer à l'étude de l'utilisation des ordinateurs dans l'enseignement de l'anglais pendant son cours d'anglais avec (nom du professeur).

_____

Signature du parent

November 1, 1988

Dear Parent,

Beginning in November, with the permission of the school principal and (teacher's name), I will be carrying out a research project on the use of computers in teaching English, in the grade eight class. The study will begin on November 14, 1988 and end on December 9, 1988.

Students will use "Macintosh Plus" computers during their English class for a period of 4 weeks.
Strict confidentiality of student performance will be maintained both during and after the study. Furthermore, this study will not interfere with the student's regular schoolwork. Participants can only benefit from this study as they will be enhancing their computer skills.

Please complete the form below and have it returned to (teacher's name) by November 4, 1988. If you require further information regarding this project please call me during the day at 246-2522.

Thank you for your consideration and support.

Sincerely,

Walid G. Haddad

Yes, _____ has my permission to participate in the study to evaluate the use of computers in teaching English.

No, _____ does not have my permission to participate in the study to evaluate the use of computers in teaching English.

_____
Parent Signature